

User's Guide

PowerSuite Help



Configuration Program

DC Power Supply System

Compack, Smartpack and Smartpack2 Based Systems

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PowerSuite Help

Welcome to *PowerSuite*

PowerSuite Online Help System, 356807.067, 3v3d, 2012-02-08
[Copyright](#) (page 372)

PowerSuite Online Help helps you getting started using *PowerSuite*. It contains overview information and procedural steps for performing common configuration tasks.

How to Find Topics

Use following buttons on the toolbar

Context button: a complete list of all topics, in a **logical order**, like a book's table of content

Index button: a complete list of all topics, in **alphabetical order**, like a book's index

Search button: enter the word or term you want to find, and a list of topics containing the term are displayed

Favorites: click this button when you have found a topic that you should want to come back to at a later stage

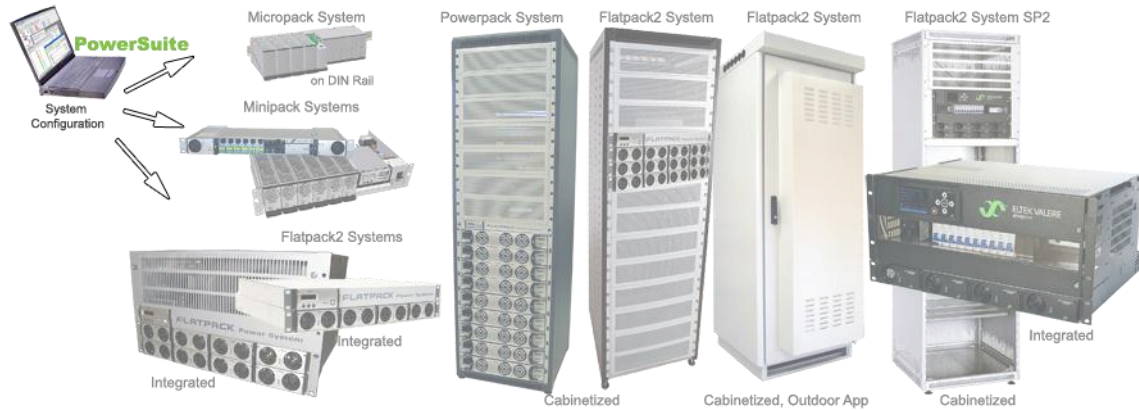
Online Help Main Sections

PowerSuite Online Help is divided into the following sections:

- [Getting Started](#), page 3
Provides introductory information about *PowerSuite*. It also includes an explanation of important concepts, system requirements, connecting the controller, etc.
- [Understanding the PowerSuite – Interface](#), page 14
Describes the location of the different elements in the *PowerSuite* user interface, the program window, the window panes, menus, icons, toolbar, the program's access levels, etc.
- “[Using PowerSuite – dialog boxes](#)” on page 27
Provides detailed information about the program's dialog boxes and commands, as well as some “[Tutorials](#)” on page 174 explaining usual procedures.
- [Functionality Description](#) (page 180)
Offers an overview of topics with more detailed descriptions of the functionality implemented in *Eltek's* DC power systems.
- [FAQs](#) (page 373) where you can find answers to some of the most Frequently Asked Questions about *Eltek's* DC power systems.

- [Glossary of Terms](#) (page 387)
Clarifies expressions, technical terms, functions, etc. used in *Eltek's* DC power systems.

Your *DC Power System* is a modern and cost-effective power supply system, specifically developed by *Eltek* for telecom and industrial applications.

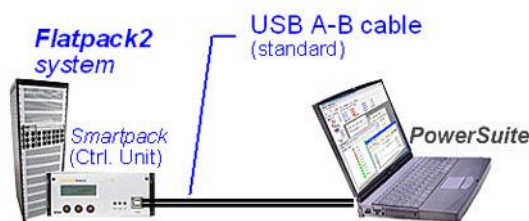


PowerSuite is a PC software application that helps you configure and operate your *DC Power System*.

Getting Started

This section provides introductory information about *PowerSuite*. It also includes an explanation of important concepts, system requirements, connecting the controller, etc.

About the *PowerSuite* Application



The *PowerSuite* software enables you to configure the DC power system, and represents an additional interface between you and the system.

PowerSuite also provides you with a graphical interface for local or remote monitoring and control of the DC power system.

The *PowerSuite* application's main

features are:

- Operates on standard PCs, running MS Windows XP operating system and higher versions, with at least 60MB free disk space and 800 by 600 screen resolution
- Uses USB serial communication between the PC and some of the *Eltek's* controllers in the DC power system
OR

Uses the RJ-45 socket in the *Eltek's* controllers for communication via an Ethernet LAN, using the UDP tunnelling protocol

- Expands the operating functionality of the *Eltek's* controllers with advanced configuration facilities, both for the user and servicing engineers

For an overview of *Eltek's* controllers, read the topic [Control Units, Controllers, CAN Nodes, etc](#) (page 352) in the [Functionality Description](#) section.

Installing PowerSuite

The *PowerSuite* software application must be installed in a PC running MS Windows Vista, MS Windows XP or MS Windows 2000.

You must have Administrator rights to your PC, to be able to install this program.

NOTICE:

- If you want to install *PowerSuite* and communicate with the controller via an Ethernet LAN (UDP tunneling protocol), follow instead the steps described in topic "[Installing PowerSuite \(Ethernet\)](#)" on page 8.
- If you want to install *PowerSuite* and communicate with the controller via its USB port, then follow the steps in this topic.

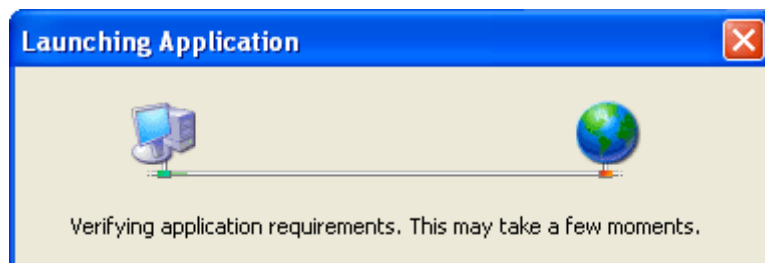
WARNING: Do NOT connect the USB communication cable to the PC before installing the application and drivers.

Follow the steps below to install *PowerSuite* and communicate with the controller via its USB port.

Continue with step "[1. Install the PowerSuite program](#)" on page 4.

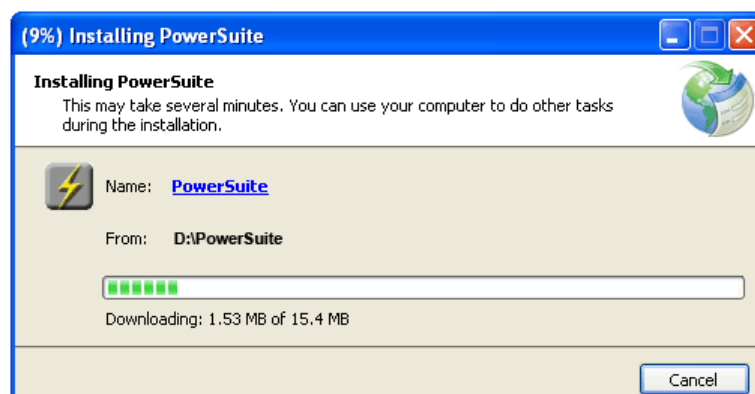
1. Install the PowerSuite program

- **Exit all Windows programs**
- **Insert the *PowerSuite* CD** into your PC's CD-ROM drive, and wait for the *InstallShield Wizard* to appear
OR
open the "setup.exe" installation file from the CD-ROM. Follow then the wizard's steps





After verification, click on the **Install** or **Run** button, to install *PowerSuite* anyway. (*Eltek* is at the moment an unknown publisher for Microsoft)

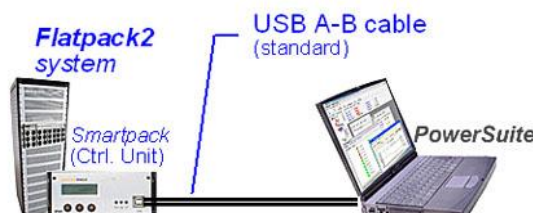


If required, the installation program will also install the “.Net” software, or upgrade older preinstalled versions.

After the installation has finished, **close the *PowerSuite*** main window.

Continue with step “[2. Switch the Smartpack ON and connect the USB cable](#)” on page 5.

2. Switch the Smartpack ON and connect the USB cable



Switch ON the power supply system, and connect the standard USB cable to the *Smartpack* controller’s USB port and to one of the PC’s USB ports.

NOTICE: Read section “[Installing USB Drivers ~ the First Time](#)” on page 7, if it is the first time you start *PowerSuite*.

Continue with step “[3. Start the PowerSuite program](#)” on page 6.

3. Start the PowerSuite program

To start the *PowerSuite* application you can either,

- Select **from the Start menu**:
“[Start](#) > [All Programs](#) > [Eltek](#) > [PowerSuite](#)”

OR

- Click on the ***PowerSuite* icon** on your desktop



OR

- You can automatically start *PowerSuite* and connect to the controller by clicking on **user-created shortcut icons** on the PC's desktop. These icons must have been created from the “[Site Manager dialog box](#)” on page 45.

NOTICE: Read section “[Selecting Language ~ the First Time](#)” on page 8, if it is the first time you start *PowerSuite*.

After starting the application, connect to the *Smartpack* controller by clicking on either “**The Last Connected Site**” button or the “**Connect**” button; the first or the second button on the left side of “[The Toolbar](#)” on page 26.

NOTICE: Read section “[Finding the COM port ~ First Time Start](#)” on page 8, if the application is not able to communicate with the controller.



PowerSuite then automatically imports the necessary data and presents an overview of the power system's most important parameters in the *Power Summary* pane. Then it opens the *Power System* dialog box with customer specific data.

For more information, see the description of the "[Program Window](#)" on page 14.

Now you are finished "[Installing PowerSuite](#)" on page 4.

Installing USB Drivers ~ the First Time

If it is the first time you run *PowerSuite*, Windows may detect that you have connected the *Smartpack* controller and the correct USB drivers need to be installed. In this case, the "Found New Hardware" dialog box may appear.

Follow the wizard's steps, and accept the default settings. The wizard will be run twice, first for the "USB Composite Driver", and then for the "Smartpack USB to UART Bridge Controller".

Note:

During the wizard's steps, click the "Continue Anyway" button, as *Eltek* is at the moment an unknown publisher for Microsoft.

The installation is completed correctly when the balloon tip <New hardware is ready to use> appears on the lower right corner of the screen, in Windows taskbar notification area (to the right of the taskbar buttons, by the clock).

Selecting Language ~ the First Time

If it is the first time you start *PowerSuite*, you have to select the language to use in the program's user interface in this dialog box.



For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

All the text in the *PowerSuite* menus, buttons, dialogue boxes, panes, etc can be displayed in one of several languages.

Do the following to select the *PowerSuite* application's language:

- Click on the “**Please Select Language**” drop-down arrow, and select the language that you want to use with *PowerSuite*, e.g. <Spanish (Español)>

The default language is English.

Note that this function does not apply to the *PowerSuite* Online Help.

You can change the program's language anytime using the Options dialog box; read the “[Language tab](#)” on page 33.

Finding the COM port ~ First Time Start

If it is the first time you start *PowerSuite*, or if the application is not able to communicate with the controller, you have to do the following:

1. **Find out the COM port number** the PC is using; see how by reading the “[Options dialog box](#)” on page 31
2. **Connect to the Smartpack controller** by, clicking the “**Connect**” button on the toolbar, and using the COM port number in the “[Site Manager dialog box](#)” on page 45

Installing PowerSuite (Ethernet)

The *PowerSuite* software application must be installed in a PC running MS Windows Vista, MS Windows XP or MS Windows 2000.

You must have Administrator rights to your PC, to be able to install this program.

NOTICE:

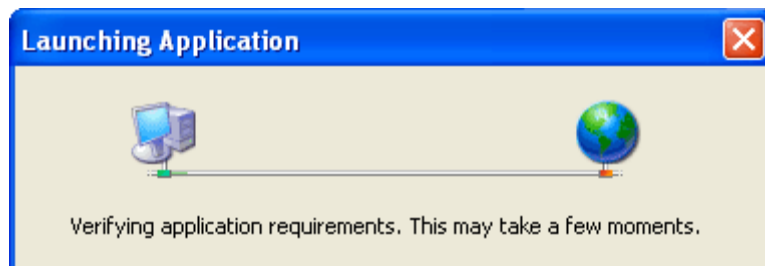
- If you want to install *PowerSuite* and communicate with the controller via its USB port, then follow instead the steps in topic “[Installing PowerSuite](#)” on page 4.
- If you want to install *PowerSuite* and communicate with the controller via an Ethernet LAN (UDP tunneling protocol), follow the steps described in this topic.

Follow the steps below to install *PowerSuite* and communicate with the controller via an Ethernet LAN (UDP tunneling protocol).

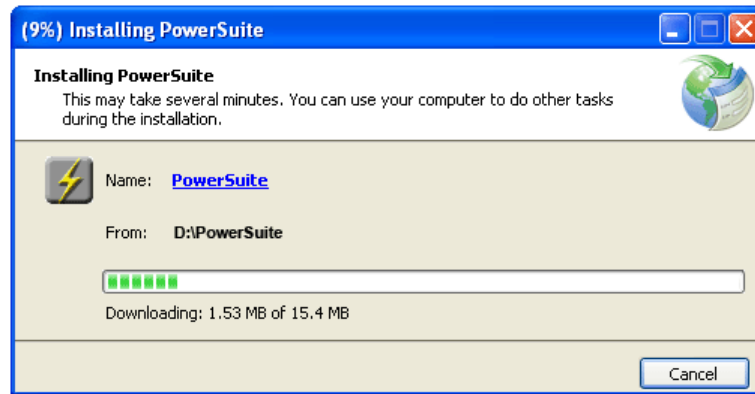
Continue with step “[1. Install the PowerSuite application](#)” on page 9.

1. Install the PowerSuite application

- **Exit all Windows programs**
- **Insert the *PowerSuite* CD** into your PC’s CD-ROM drive, and wait for the *InstallShield Wizard* to appear
OR
open the “setup.exe” installation file from the CD-ROM. Follow then the wizard’s steps



After verification, click on the **Install** or **Run** button, to install *PowerSuite* anyway. (*Eltek* is at the moment an unknown publisher for Microsoft)



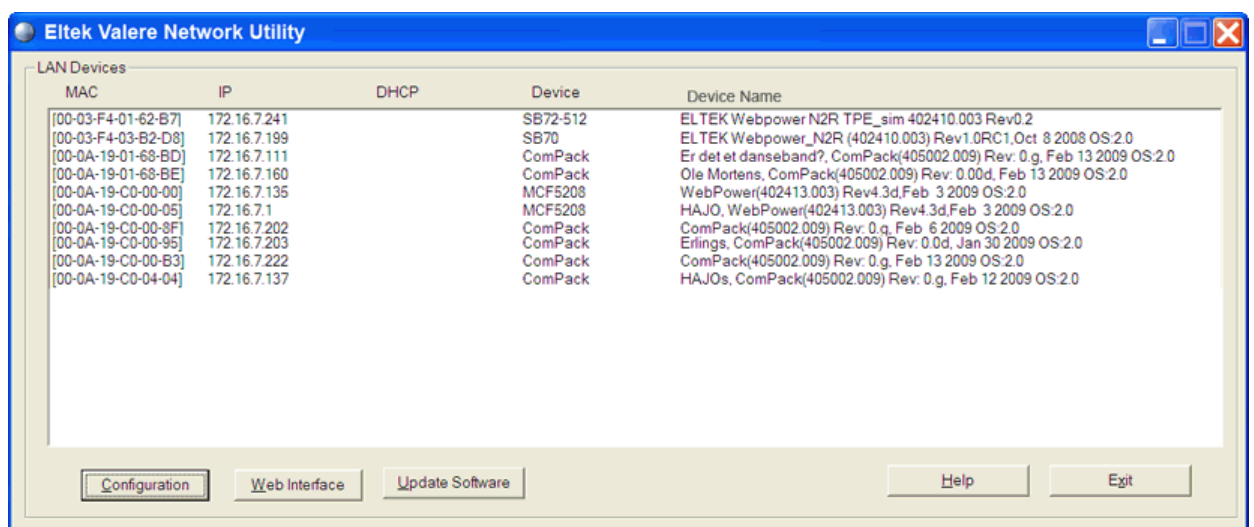
If required, the installation program will also install the “.Net” software, or upgrade older preinstalled versions.

After the installation has finished, **close the *PowerSuite* main window.**

Continue with step “[2. Start the “*Eltek Network Utility*” program](#)” on page 10.

2. Start the “*Eltek Network Utility*” program

Open the file “EVIPSetup.exe”, which will display the connected LAN devices. The controller will be displayed after connection to the LAN.

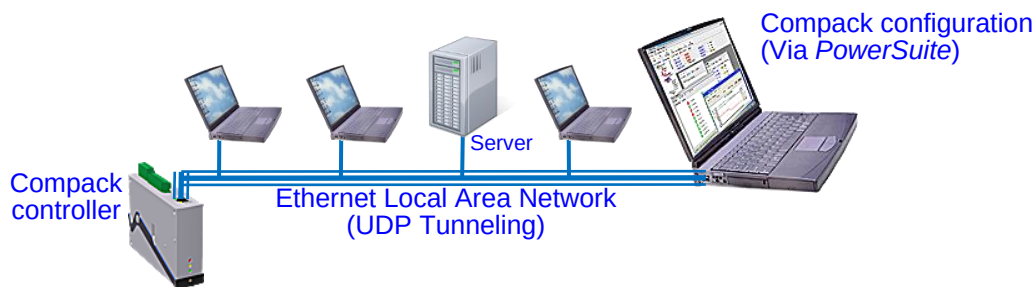


(Example of connected LAN devices)

Continue with step “[3. Connect the controller to the LAN](#)” on page 10.

3. Connect the controller to the LAN

Plug one end of a standard Ethernet cable (straight through Ethernet cable) to the controller’s RJ-45 socket, and the other end to one of the LAN’s available RJ-45 sockets.



(Example of *Compack* controller configuration via *PowerSuite*)

The controller automatically obtains an IP address from the LAN server, as the controller's DHCP protocol is enabled from factory.

Continue with step "[4. Identify the controller in the Network Utility program](#)" on page 11.

4. Identify the controller in the Network Utility program

Look for your controller's MAC address on the list of connected LAN devices.

All controllers are shipped with a label specifying its unique MAC address. Check that the displayed MAC address corresponds to the MAC address label on the controller

Notice that it can take up to 1 minute before the connected controller is displayed in the utility program.

Your Controller's MAC Address (00-0A-19-C0-00-91)

Controller's Device Name and firmware revision

MAC	IP	DHCP	Device	Device Name
[00-03-F4-07-62-B7]	172.16.7.241		SB72-512	ELTEK Webpower N2R TPE_sim 402410.003 Rev:0.2
[00-03-F4-07-B2-D8]	172.16.7.199		SB70	ELTEK Webpower_N2R (402410.003) Rev:1.0RC1, Oct 8 2008 OS:2.0
[00-0A-19-01-68-BD]	172.16.7.111		ComPack	Er det et danseband?, ComPack(405002.009) Rev: 0.g, Feb 13 2009 OS:2.0
[00-0A-19-01-68-BE]	172.16.7.160		ComPack	Ole Mogens, ComPack(405002.009) Rev: 0.00d, Feb 13 2009 OS:2.0
[00-0A-19-C0-00-00]	172.16.7.135		MCF5208	WebPower(402413.003) Rev:4.3d, Feb 3 2009 OS:2.0
[00-0A-19-C0-00-05]	172.16.7.1		MCF5208	HAJO, WebPower(402413.003) Rev:4.3d, Feb 3 2009 OS:2.0
[00-0A-19-C0-00-8F]	172.16.7.202		ComPack	ComPack(405002.009) Rev: 0.g, Feb 6 2009 OS:2.0
[00-0A-19-C0-00-95]	172.16.7.203		ComPack	Erlings, ComPack(405002.009) Rev: 0.0d, Jan 30 2009 OS:2.0
[00-0A-19-C0-00-B3]	172.16.7.222		ComPack	ComPack(405002.009) Rev: 0.g, Feb 13 2009 OS:2.0
[00-0A-19-C0-04-04]	172.16.7.137		ComPack	HAJO's, ComPack(405002.009) Rev: 0.g, Feb 12 2009 OS:2.0
[00-0A-19-C0-00-91]	172.16.5.75	DHCP	ComPack	Micropack System, EV Engine Room, Oslo Compack(405002.009) Rev:0.g F

DHCP obtained IP Address (172.16.5.75)

(Example of controller's data)

Make a note of the controller's IP address and Device Name

Continue with step “[5. Start the PowerSuite application in your computer](#)” on page 12.

5. Start the PowerSuite application in your computer

(The computer has to be connected to the same LAN as the controller.)

- Selecting from the **Start menu**, in MS Windows:
“[Start](#) > [All Programs](#) > [Eltek](#) > [PowerSuite](#)”

OR

- Clicking on the **PowerSuite icon** on your computer’s desktop



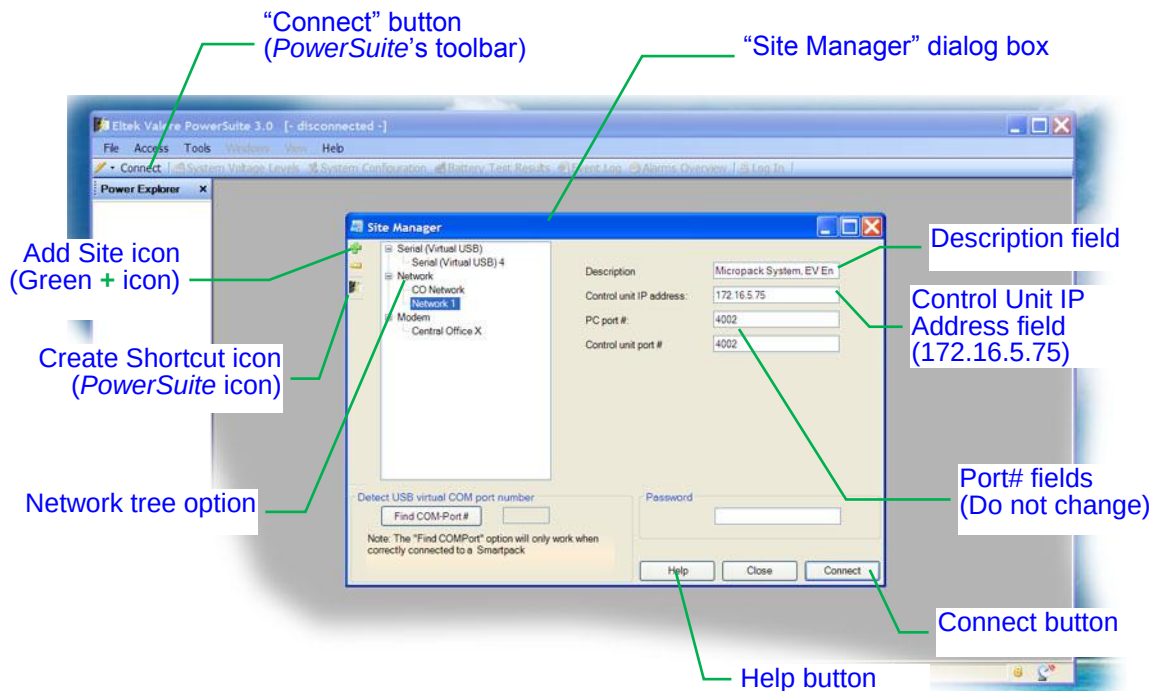
NOTICE: Read section “[Selecting Language ~ the First Time](#)” on page 8, if it is the first time you start *PowerSuite*.

Continue with step “[6. Create and save a new Network Site for the controller](#)” on page 12.

6. Create and save a new Network Site for the controller

Carrying out the following:

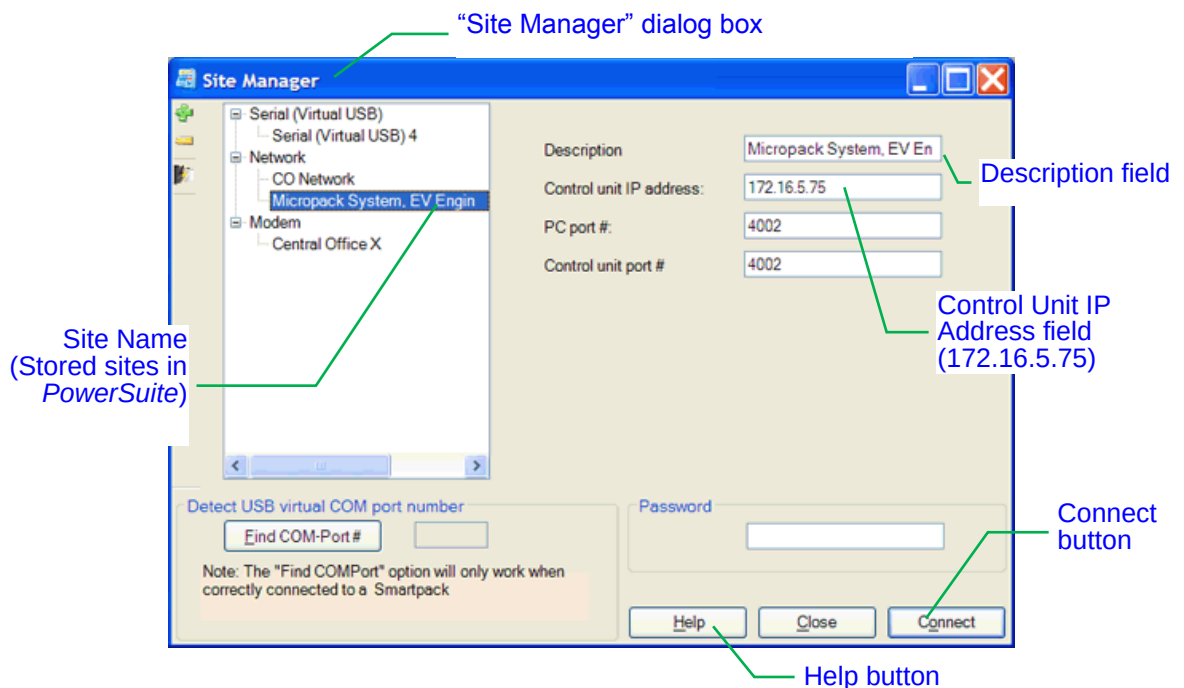
- Click on the “**Connect**” button, on the *PowerSuite* toolbar
- Click on the “**Network**” tree option on the Site Manager dialog box
- Click on the Add Site icon (green +)
- Edit the “**Description**” field. E.g. enter the controller’s Device Name “Micropack System, EV Engine Room, Oslo”
- Edit the “**Control Unit IP Address**” field, and enter the controller’s IP address:
e.g. “172.16.5.75”. Do not change the Port# fields!
- Click on the “**Connect**” button, on the Site Manager dialog box



(Example of PowerSuite’s Site Manager dialog box)

PowerSuite will then connect to the controller on the LAN with IP address “172.16.5.75”.

You can any time click on the dialog box’s Help button for additional description.



(Example of PowerSuite’s Site Manager dialog box)

The set of communication parameters will be saved with the name you entered in the “Description” field, e.g.: “Micropack System, EV Engine Room, Oslo”.

Next time you want to connect with this site (this controller), click on the “**Connect**” button on the toolbar, select the **Site Name** in the Site Manager tree and click on the dialog box’s “**Connect**” button.

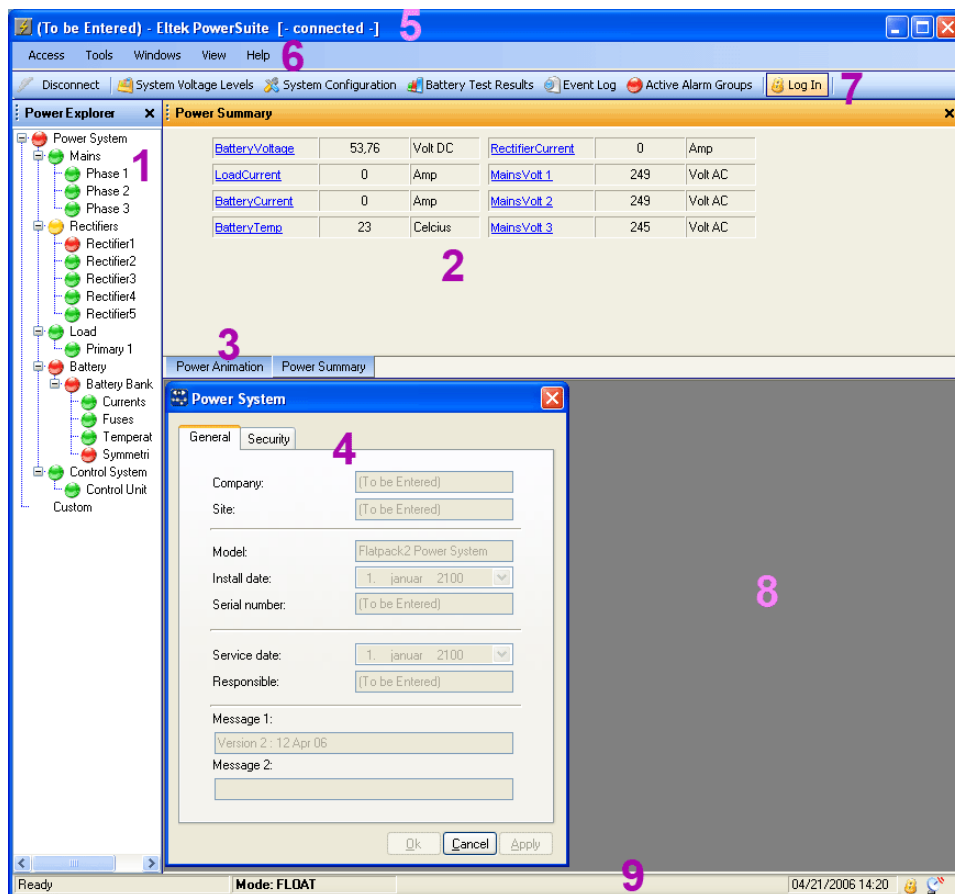
Now you are finished “[Installing PowerSuite \(Ethernet\)](#)” on page 8.

Understanding the PowerSuite – Interface

This section describes the location of the different elements in the *PowerSuite* user interface, the program window, the window panes, menus, icons, toolbar, the program’s access levels, etc.

Program Window

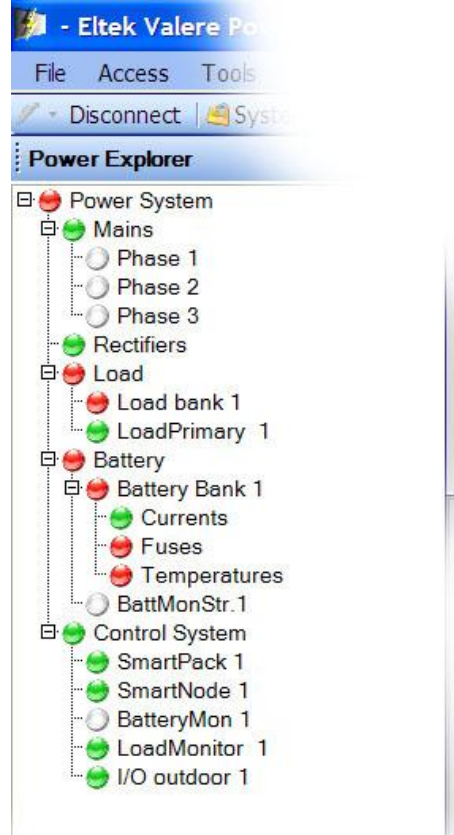
When you start *PowerSuite* -- read “[Installing PowerSuite](#)”, page 4 -- the main program window appears. This window is your working area. It contains the commands and tools you need to configure the power supply system.



The main areas are:

Power Explorer pane (1)

The pane displays a hierarchical tree structure (Windows Explorer style) with coloured icons and expandable branches. The tree represents the main components in the power supply system.



The **coloured icons** represent the “health” of the groups and the units:

- Green: No alarm
- Yellow: Minor alarm
- Red: Major Alarm
- Gray: unconnected or malfunctioning unit

To **expand and collapse the branches** of groups and sub-groups, you can click on the “+” and “-“ symbols on the icons’ left side. Thus the branches will be displayed or hidden.

Read also topic [The window panes](#), page 17 for information about working with window panes.

To view an example of a **large Power Explorer pane** containing many components in a power supply system, see topic “[Control Unit Outdoor tab](#)” on page 156.

Power Summary (2) and Power Animation (3) panes

Show an overview of the power system’s most important parameters, displayed in a summary table (2) and in an animated diagram (3) (hidden under the Power Summary pane).

On the Power Summary pane, **click on the links** (underlined text) to open the respective alarm monitor dialog box. See “[Alarm Monitor](#)” on page 163.

- The “**LoadCurrent**” alarm monitor **does not really measure** the load current. It raises alarms based on the calculation of the load current (the difference between the rectifier current “RectifierCurrent” and the battery current “BatteryCurrent”). Read also the [Load Current Calculation](#) (page 292) topic in the [Functionality Description](#) section.

In addition to the Power Summary pane, this alarm monitor is also displayed in “[Load dialog box](#)” on page 95.

- The “**BatteryCurrent**” and the “**BatteryTemp**” alarm monitors **do not really measure** these values either.

The “BatteryCurrent” alarm monitor generates alarms based on the addition of the current measurements performed by the individual battery current alarm monitors; see “[Currents dialog box](#)” on page 127. The “BatteryTemp” alarm monitor generates alarms based on the highest temperature measurement performed by the individual battery temperature alarm monitors; see “[Temperatures dialog box](#)” on page 129.

In addition to the Power Summary pane, these alarm monitor are also displayed in the “[Battery dialog box](#)” on page 105.

- The “**RectifierCurrent**” alarm monitor **does not really measure** the rectifier current. It raises alarms based on the addition of all the rectifier currents.

In addition to the Power Summary pane, this alarm monitor is also displayed in “[Rectifier dialog box](#)” on page 83.

On the Power Animation pane, **click on the** rectifier, battery or load **icons** to open the respective alarm monitor dialog boxes.

Read also topic [The window panes](#), page 17 for information about working with window panes.

Power System Dialog Box (4)

Displays editable customer specific data about the site and power supply system

Title bar (5)

It shows the name of the site (entered in the Power System dialog box (4), the program name and the *Smartpack* connection status.

Right-click on the title bar to display a shortcut menu with commands to maximize, minimize, close, etc. the program window.
Or click on the buttons on the right hand of the bar.

Menu bar (6) and Toolbar (7)

Show the names of pull-down menus (6) containing commands to perform tasks. The toolbar (7) displays buttons for common commands. For more information, read “[Menus, Icons and Toolbar](#)” page 20.

The Working Area (8)

Is where panes and dialog boxes are displayed.

The Status Bar (9)

The bar displays information about the system. On the left hand side, system messages as “Reading data from...” or “Ready”, etc.

On the middle, the status bar displays the [power system's operation mode](#) (page 242), “FLOAT”, “TEST”, etc.

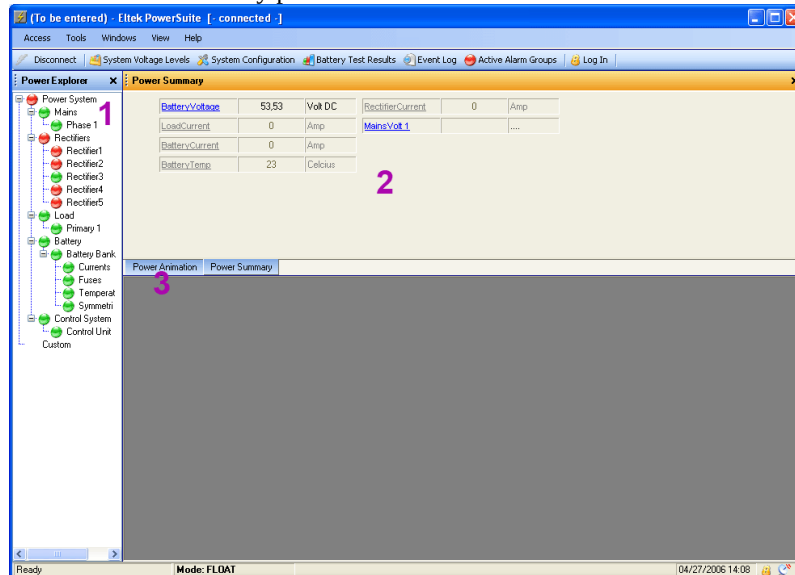
On the right hand side of the status bar you find the Access Level (in clear text), the power system's date and time, icons for the Access Level (the padlock) and the connection status (sending antenna). You find more info about “[Access Levels](#)” on page 19.

The window panes

The *PowerSuite* main program window displays in three different window panes:

- Power Explorer pane (1)
- Power Summary pane (2)
- Power Animation pane (3)

When you start *PowerSuite*, the panels are always located at their **default position**. The Power Explorer pane (1) on left side, the Power Summary pane (2) under the toolbar and the Power Animation pane (3) hidden under the Power Summary pane.

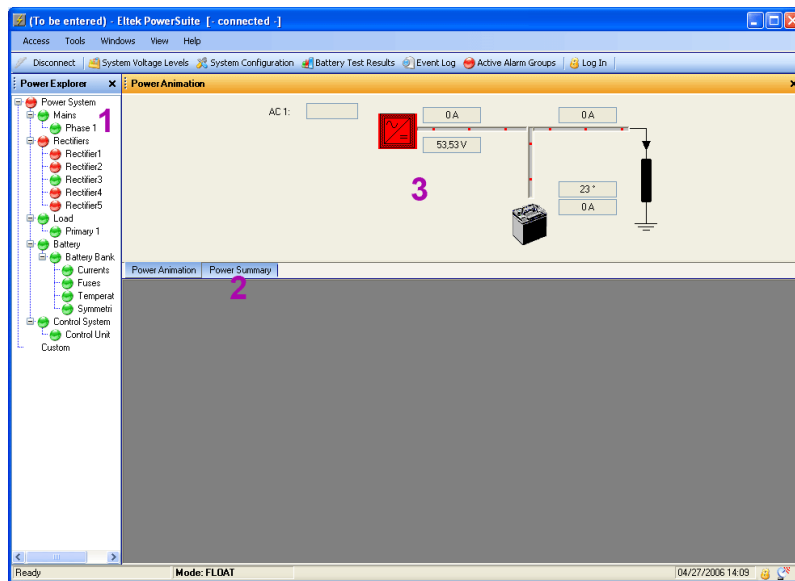


To display or hide the panes

Click on the buttons (2) to display the Power Summary pane or the Power Animation pane (3), one at a time.

OR

Use the commands in the “[View Menu](#)” on page 23, or the shortcut keys <Ctrl+E>, <Ctrl+A> and <Ctrl+S>, to display or hide the panes.

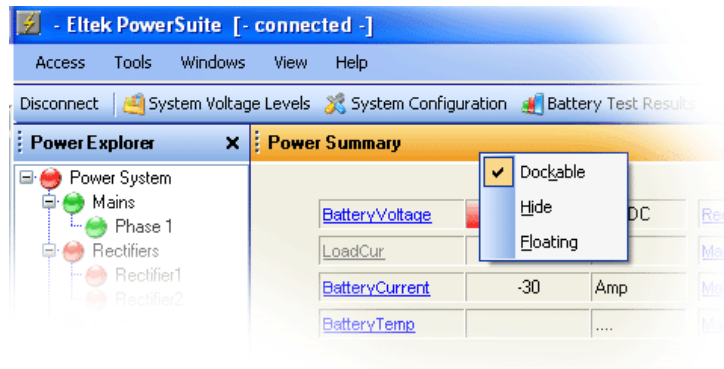


You can also adjust the size of the panes by pointing somewhere along the pane's border, and dragging with the resizing cursor (←||→).

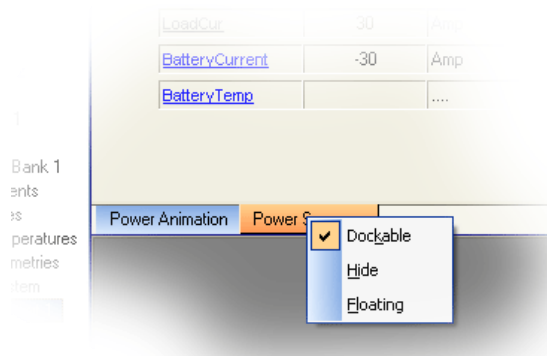
To relocate the panes

Right-click on the pane's **title bar or button** to display a floating menu with positioning commands. Select:

- **Dockable** -- Automatically locates the pane in its default position
- **Hide** -- The pane is removed from the screen. Use the View menu or shortcut key to displayed again
- **Floating** -- The pane is automatically moved to a “floating” window on the screen

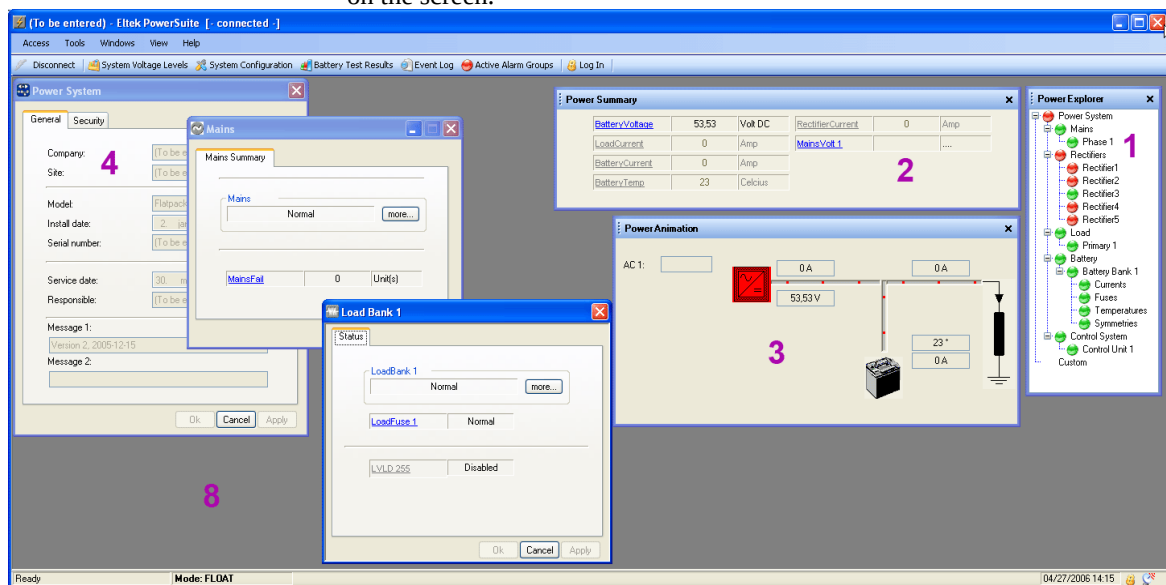


Floating menu on the title bar



Floating menu on the pane's button

Also, by dragging from the panes' names on their title bar, they can be moved away from their docked default location, and repositioned to any suitable place on the screen.



The working area (8) is still available for displaying dialog boxes, etc.

You can manually relocate the displayed panes and dialog boxes by dragging them from their names on the title bars.

☞ To automatically return all panes to their default position, click the *PowerSuite* window red Close button, to exit the program, and then restart *PowerSuite*.

Read more about panel related commands on sections [Program Window](#), page 14, and [Right-Click Menus](#), page 24.

Access Levels

PowerSuite protects system parameters and other configured values with three different access levels. These correspond to the access levels used by the controller. The three levels are:

- **User Access Level**
is the default level when you start *PowerSuite*. Log in is not required. You can read all parameters and values in the dialog boxes (Read

Access), but changing them is not allowed. The dialog boxes' Apply and OK buttons are disabled.

- **Service Access Level**

By logging in to this level you can change most of the system parameters and values available in dialog boxes (Write Access). Read how to do it in the "[Log In dialog box](#)" on page 28.

The default password is <0003>. We strongly recommend changing this password as soon as the power system is installed. Read how to do it in the "[Change Password dialog box](#)" on page 29.

Notice that factory parameters may not be changed (Read Access).

- **Factory Access Level**

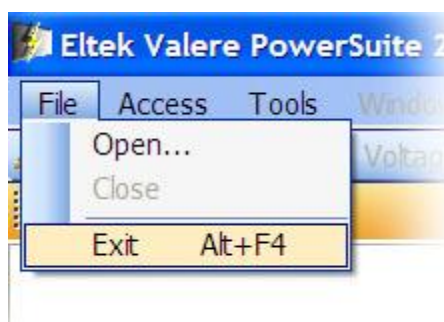
As the name indicates, only *Eltek* personnel will have access to change certain critical values, such as LVD settings, etc.

Menus, Icons and Toolbar

The menu bar at the top of the *PowerSuite* "[Program Window](#)" on page 14, shows the names of pull-down menus containing commands to perform tasks.

File Menu

You can pull down the File Menu by clicking on "**File**" on the menu bar, or typing <Alt+F>. The menu displays following commands:



Instead of connecting *PowerSuite* to a site, you can open and edit a site configuration file.

- **Open** -- *PowerSuite* opens the "Load a new Smartpack configuration from file" dialog box, where you can select a site configuration file (XML format) to open.
Thus you can edit and change the site configuration, without connecting to the site's *Smartpack* controller (offline)
- **Close** -- *PowerSuite* closes the site configuration file (XML format)
- **Exit (Alt+F4)** -- Closes the *PowerSuite* program window.
Shortcut key F4 performs the same task.

About Offline Editing Site Configuration Files

PowerSuite enables you to save in a site configuration file in your computer, the DC power system's configuration parameters.

Later -- without being physically connected to the site -- you can open and edit the site configuration file, (**Offline editing**).

When you change a parameter in a dialog box and you click on the "**Apply**" or "**OK**" buttons, *PowerSuite* will write the changes directly to the opened site configuration file.

Notice that site configuration files can be offline edited as long as they have a maximum of two *Smartpack* controllers and one I/O Monitor.

The *PowerSuite*'s offline editing functionality may be also be used for demonstration purposes. If no special site configuration file is available, you can always open and edit the *Smartpack* default file (installed in the My Documents/Eltek/PowerSuite).

Access Menu

You can pull down the Access Menu by clicking on “**Access**” on the menu bar, or typing <Alt+A>. The menu displays following commands:

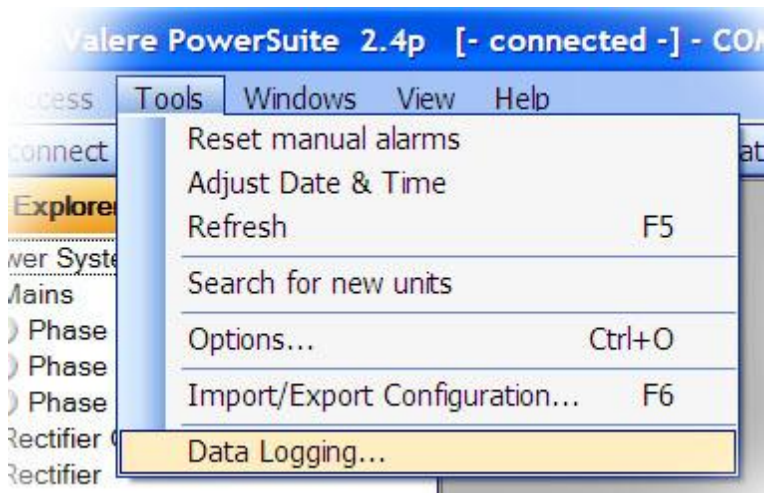


Note that the commands will be active after connection.

- **Connect (Ctrl+F2)** -- *PowerSuite* opens the “[Site Manager dialog box](#)” on page 45, where you can select the site (stored communication parameters) the program will use to communicate with the connected controller.
Shortcut key Ctrl+F2 or the Connect button on the toolbar performs the same task.
- **Disconnect (F3)** -- *PowerSuite* stops communicating with the connected controller.
Shortcut key F3 or the Disconnect button on the toolbar performs the same task.
- **Login (F4)** -- *PowerSuite* opens the “[Log In dialog box](#)” on page 28, so that you can log in to either the Service or Factory Access Level, thus being able to change configuration parameters, adjusting system levels, etc.
Shortcut key F4 or the Log In button on the toolbar performs the same task.
- **Logout** -- *PowerSuite* logs you out to User Access Level (default).
Open dialog boxes will deactivate their parameter fields (displayed in grey colour) and their Apply and OK buttons. You are then not allowed to change values and parameters.
The Log Out button on the toolbar performs the same task.
- **Change Password** -- *PowerSuite* opens the “[Change Password dialog box](#)” on page 29, so that you can change the passwords to the Service Access Level and the Factory Access Level, one at a time.

Tools Menu

You can pull down the Tools Menu by clicking on “**Tools**” on the menu bar, or typing <Alt+T>. The menu displays following commands:



- **Reset manual alarms** – *PowerSuite* resets all alarms generated by alarm monitors configured for manual alarm reset. Read more in [“Alarm Monitor General tab”](#) on page 164. Before the alarms are reset, the “Are you sure?” dialog box will ask you to confirm the reset action
- **Adjust Date Time** -- *PowerSuite* opens the [“Date and Time dialog box”](#) on page 31, where you can adjust the power system’s date and time stored in the controller.
- **Refresh (F5)** -- *PowerSuite* gets new data from the controller, and updates the information displayed in the active dialog box (blue title bar).
Shortcut key F5 performs the same task.
- **Search for New Units** -- *PowerSuite* resets the Power Explorer pane, and interrogates the controller to check for new connected control units and rectifiers since last time *PowerSuite* was connected to the controller. *PowerSuite* then updates the tree structure in the Power Explorer pane.

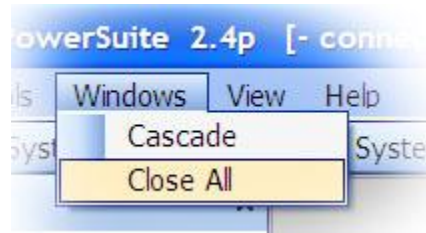
The same command can be selected from the Power Explorer pane’s [“Right-Click Menu”](#) on page 24.

Consider also the command “Reset Number of modules” in the System Configuration dialog box, in the [“Restore Settings tab”](#) on page 53.

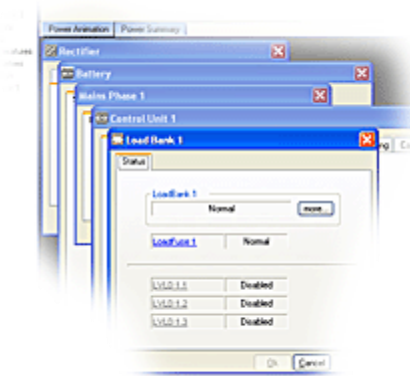
- **Options (Ctrl+O)** -- *PowerSuite* opens the [“Options dialog box”](#) on page 31, where you can configure program alternatives, such as view options, language, etc.
Shortcut key Ctrl+O performs the same task.
- **Import/Export Configuration (F6)** -- *PowerSuite* opens the [“Import/Export Configuration dialog box”](#) on page 33 that enables you to:
 1. Read configuration data from a file or a connected control unit into *PowerSuite* memory and then
 2. Write the imported configuration data to a file or to a different control unit.
 Shortcut key F6 performs the same task.
- **Data Logging** -- *PowerSuite* opens the [“Data Logging dialog box”](#) on page 43 that enables you to configure *PowerSuite* to automatically request for the power system’s parameters, and save them in a file (XLM) on the computer

Windows Menu

You can pull down the Window Menu by clicking on “**Window**” on the menu bar, or typing <Alt+W>. The menu displays following commands:



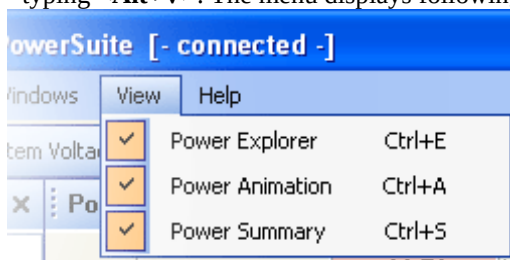
- **Cascade** -- *PowerSuite* positions all open dialog boxes on top of each other, a bit displaced downwards and to the right, so that all *title bars* are readable, and with the active dialog box still on top



- **Close All** -- *PowerSuite* closes effectively all open dialog boxes.
TIP OFF: Shortcut key Ctrl+F4 closes the active dialog box, the one top.

View Menu

You can pull down the View Menu by clicking on “**View**” on the menu bar, or typing <Alt+V>. The menu displays following commands:

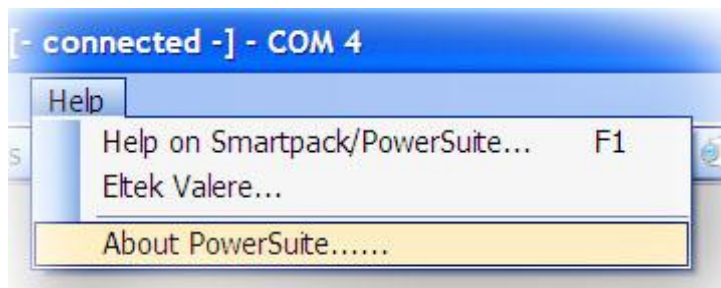


- **Power Explorer (Ctrl+E)** -- *PowerSuite* displays or hides the *Power Explorer* pane.
Shortcut key Ctrl+E performs the same task.
- **Power Animation (Ctrl+A)** -- *PowerSuite* displays or hides the *Power Animation* pane.
Shortcut key Ctrl+A performs the same task.
- **Power Summary (Ctrl+S)** -- *PowerSuite* displays or hides the *Power Summary* pane.
Shortcut key Ctrl+S performs the same task.

Read more about the [Program Window](#), page 14 or [The window panes](#), page 17.

Help Menu

You can pull down the Help Menu by clicking on “**Help**” on the menu bar, or typing <Alt+H>. The menu displays following commands:



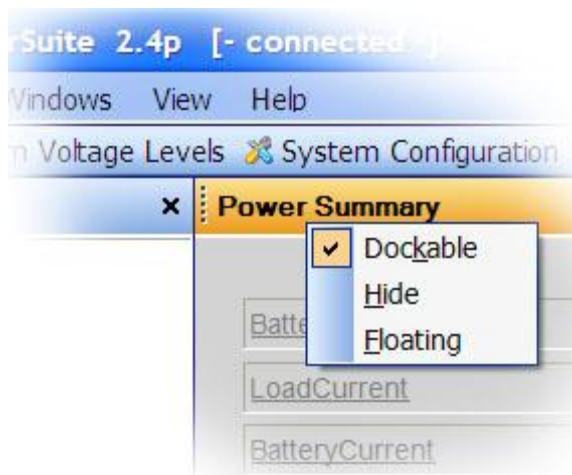
- **Help on ... (F1)** -- *PowerSuite* opens the online help file system (this file).
Shortcut key F1 performs the same task.
- **Eltek...** -- *PowerSuite* opens the *Eltek* home page in Internet.
- **About PowerSuite...** -- Displays information about *PowerSuite*’s revision and part number.

Right-Click Menus

Right-click menus are easy and effective ways of accessing commands. By pointing and right-clicking an item on the screen, a floating menu may be displayed showing commands related to the item.

The picture below shows some examples of right-click menus:

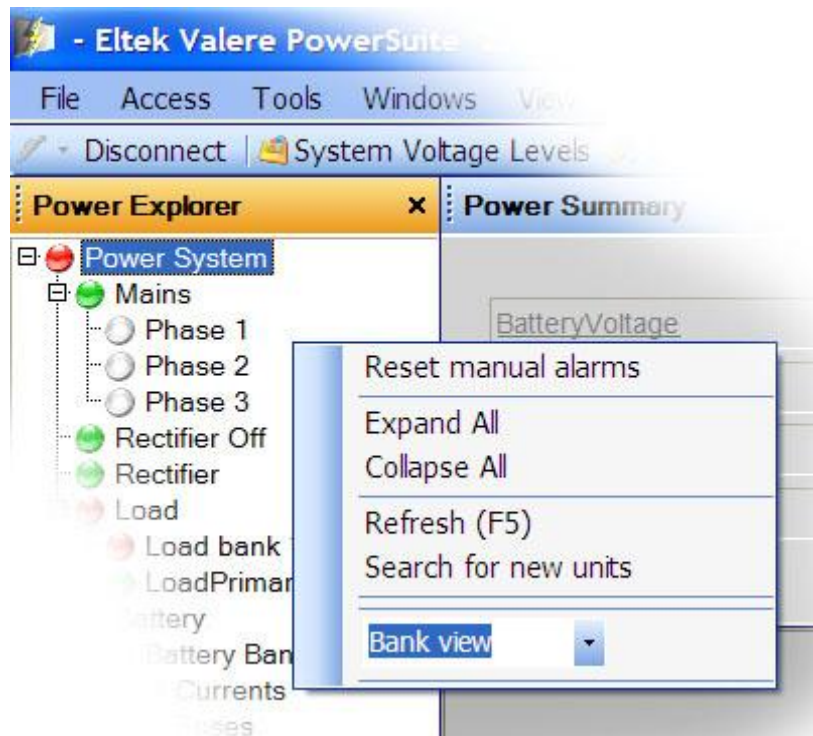
Right-Click Menus on Panes



Right-click any place on the pane’s **title bar or button** (e.g. Power Summary) to display a floating menu with positioning commands.

For information about the commands, read topic [The window panes](#), page 17 for information about working with window panes.

Right-Click Menu on the Power Explorer Pane

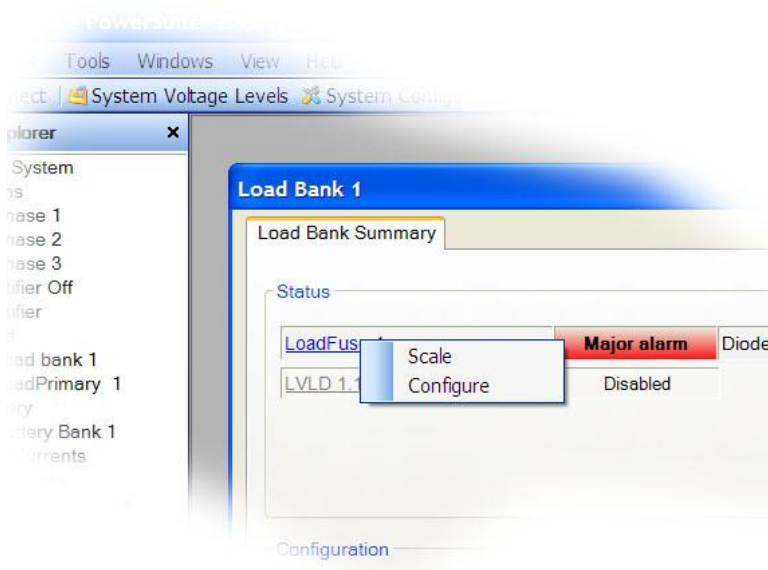


Right-click any place on the **Power Explorer** pane's inside or content to display a floating menu with commands related to the Power System tree structure.

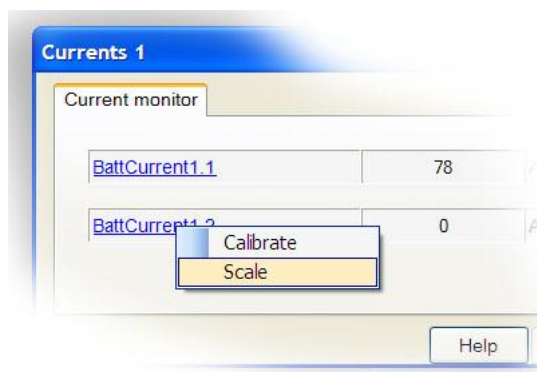
For information about the command:

- “**Reset manual alarms**”,
“**Refresh**” and
“**Search for new units**”,
read topic “[Tools Menu](#)” on page 21
- “**Expand All**” and
“**Collapse All**”,
read about the Power Explorer pane in the topic “[Program Window](#)” on page 14
- “**Bank View**”,
click on the drop-down arrow and select one of the battery bank profiles.
read more about this on topic “[Tools Menu](#)” on page 21

Right-Click Menu on Alarm Monitor Links



OR



Right-click on certain **alarm monitor links** in dialog boxes to display a floating menu with commands related to the alarm monitor's configuration, calibration or scaling, etc.

Clicking on the alarm monitor links will open the "[Alarm Monitor dialog boxes](#)" on page 163, where you find information about command.

The Toolbar

The toolbar displays buttons for common commands.



Toolbar displayed after connecting and logging in.

Before connecting PowerSuite to the controller, only two buttons are active:

- **Last Connected Site button** -- (first button from the left).
-- Click on the button and PowerSuite attempts connecting to the controller with the last used connection data (the last accessed site). See also the "[Site Manager dialog box](#)" on page 45.
-- Or click on the drop-down arrow by the button, to select connection data from the last accessed sites.
- **Connect button (F2)** -- (second button from the left. After connection, the button's name is "Disconnect")

PowerSuite opens the “[Site Manager dialog box](#)” on page 45, so that you can select how to communicate with the connected controller. Read also “[Access Menu](#)” on page 21

After connecting *PowerSuite* to the controller, the following buttons are active:

- **Disconnect button (F3)** -- *PowerSuite* stops communicating with the connected controller.
Read also “[Access Menu](#)” on page 21
- **System Voltage Levels button** -- *PowerSuite* opens the “[System Voltage Levels dialog box](#)”, page 49, where you can change important voltages in the power system.
- **System Configuration button** -- *PowerSuite* opens the “[System Configuration dialog box](#)”, page 50, where you can change the power system’s global parameters, such as nominal float voltage and polarity, temperature scale, critical operational mode conditions, etc.
- **Battery Test Results button** -- *PowerSuite* opens the “[Battery Test Results dialog box](#)”, page 138, where you can view numerically and graphically the power system’s battery tests results. The results data can also be exported to a file in your hard disc.
- **Event Log button** -- *PowerSuite* opens the “[Control System Event Log tab](#)” on page 142 to display in different manners a log of events.
Read more about “events” in the topic [Alarm Monitors](#) (page 324), in the [Functionality Description section](#)
- **Alarms Overview button** -- *PowerSuite* opens the “[Alarms Overview dialog box](#)” on page 55, giving you an overview of the status of all alarms (Alarm Output Groups), as well as which alarm monitors have triggered the alarms.
In the Configuration tab of the Alarms Overview dialog box, using drag-and-drop, you can configure which alarm monitors will active which Alarm Output Groups.
In the Outputs tab of the Alarms Overview dialog box, you can configure the Alarm Output Groups.
- **Log In button** -- *PowerSuite* opens the “[Log In dialog box](#)” on page 28, so that you can log in to either the Service or Factory Access Level, thus being able to change configuration parameters, adjusting system levels, etc.
Read also “[Access Menu](#)” on page 21

OR

If you are logged in, the “**Log Out**” button is displayed instead. Clicking on the button will automatically log you out.

Using PowerSuite – dialog boxes

This section presents information about the program’s dialog boxes and commands, as well as some “[Tutorials](#)” on page 174 explaining procedures to accomplish common system configuration tasks using *PowerSuite*.

PowerSuite has 3 main functional areas, where you open program dialogue boxes to interact and configure the DC power supply system.

- Menu Bar
- Toolbar
- Power Explorer pane

In the Alarm Monitor topic below, you find how to interact with the alarm monitor dialogue boxes, and an overview of available alarm monitors.

Menu Bar dialog boxes

This topic describes the dialogue boxes accessible from the *PowerSuite* menu bar. Refer to the “[Program Window](#)” on page 14.

Access Menu dialogue boxes

Read also a short description of the commands on the “[Access Menu](#)” on page 21.

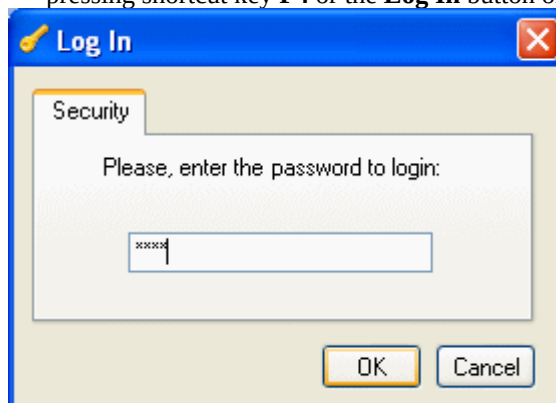
For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Connect – Site Manager dialogue box

Selecting the “**Connect**” command on the “[Access Menu](#)” on page 21, or clicking on the “**Connect**” button (F2) on the “[The Toolbar](#)” on page 26, will display the “[Site Manager dialogue box](#)” on page 45.

Log In dialog box

This dialog box is displayed by selecting from the menu “**Access > Login**”, pressing shortcut key **F4** or the **Log In** button on the toolbar.



1. **Type the password** for either the Service Access Level or the Factory Access Level
2. Click on the **OK button**

Only integers are accepted as passwords.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

When the correct password is entered, *PowerSuite* will upload the necessary parameters from the controller, if required.

Open dialog boxes will activate their parameter fields (displayed in black colour) and their Apply and OK buttons. You are then allowed to change values and parameters.

NOTICE: The default Service Access Level password is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

Read how to do it in the “[Change Password dialog box](#)” on page 29.

Checking the active Access Level

The padlock in the right hand side of the status bar – and the text on the left side of the date and time -- indicates the Access Level status. Refer to the “[The Status Bar \(9\)](#)” on page 16.

Locked padlock indicates *PowerSuite* is in User Access Level (default).

Open padlock indicates *PowerSuite* is in either Service or Factory Access Level.

To check the exact access level you are logged in with, do following:

1. Double-click the Power System icon, on the top of the Power Explorer pane, to open the “[Power System dialog box](#)” on page 64.
2. Click on the Security tab

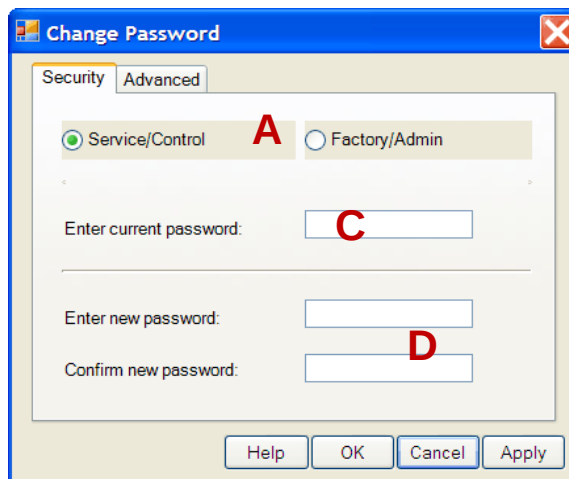
The Access Level field indicates the actual active level.

Change Password dialog box

This dialog box is displayed by selecting from the menu “**Access > Change Password**”.

Change Password - Security tab

Click on the “**Security**” tab, to show its data, if necessary.



To change one of the passwords, do following:

1. **Select type of Access Level** to change, by clicking on the radio button (A) for the actual type (Service or Factory)
2. Click in the “current password” text field (C), and **type the active password** to be changed

3. Click in the “new password” text field (D), and **type the new password. Retype the new password** in the “confirm new password” field
4. Click the **Apply button**

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

NOTICE: The default Service Access Level password is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

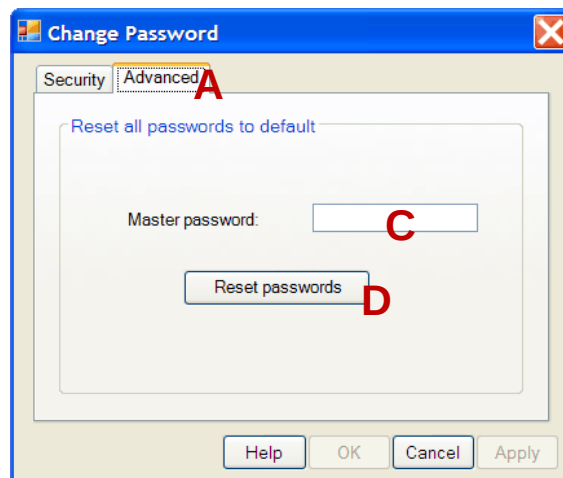
WARNING:

Make a note of the changed password. You will not be able to log in, if you forget it, and will have to contact *Eltek* to reset it to default.

If you change and forget the control system’s default password, you will need a **Master Password** to reset all passwords to default. Read topic Master Password – Reset All Passwords, in the [Functionality Description section](#).

Change Password - Advanced tab

Click on the “**Advanced**” tab (A), to show its data.



To to reset all passwords to default, do following:

1. **Type the Master Password** code in the Master Password field (C).
Eltek Service Department will provide you with the Master Password code
2. Click in the “**Reset Passwords**” button (D)

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

For a description of the procedure to get the Master Password code, read topic Master Password – Reset All Passwords, in the [Functionality Description section](#)

Tools Menu dialogue boxes

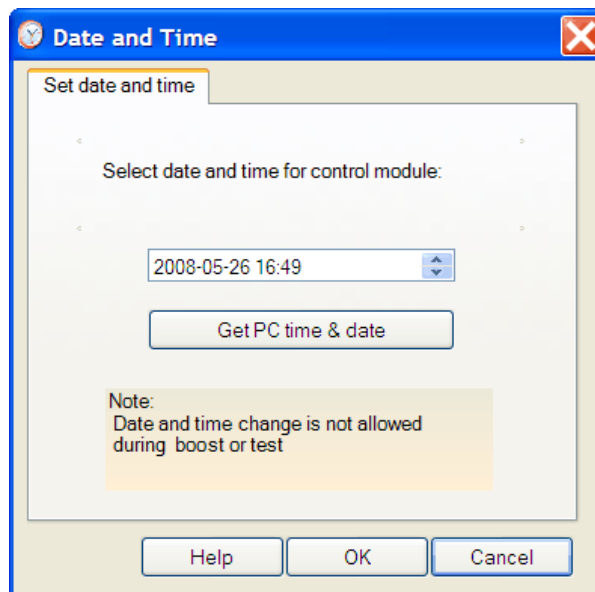
Read also a short description of the commands on the “[Tools Menu](#)” on page 21.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Date and Time dialog box

This dialog box is displayed by selecting from the menu “**Tools > Adjust Date Time**”.

Notice that changing the Date and Time of the control unit is NOT allowed while the system is boost-charging or testing the batteries.



To change the control unit's the date and time (the DC power system's clock), you carry out the following:

- **Click on the text field** -- on the year (e.g. 2008) or the month (e.g. 05) or the day (e.g. 26) or the hour (e.g. 16) or the minutes (e.g. 49) -- **to select the parameter to change**
- **Click on the text field's up or down arrows** to increase or decrease the selected parameter
- Repeat both steps above to change a new parameter
- Click on the **OK button**, when all parameters are as correct configured

Clicking on the “**Get PC Time & Date**” button will obtain the date and time used by the computer running *PowerSuite*.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Options dialog box

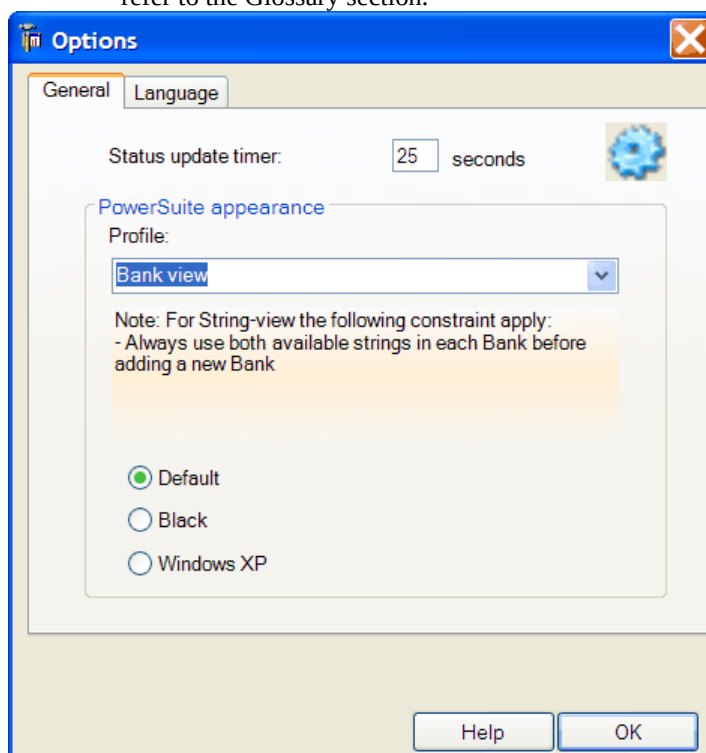
This dialog box is displayed by selecting from the menu “**Tools > Options**”, or the shortcut keys **Ctrl+O**

You can use the tool and change application options in this dialogue box from the default User Access Level (log in is not required).

General tab

If necessary, click on the “**General**” tab, to show its data.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.



In this dialogue box you can configure following *PowerSuite* general options:

Status Update Timer

To configure how often the displayed data is updated on the active dialogue box, on the Power Explorer pane and on the Power Summary pane, you carry out the following:

- Click on the “**Status Update Timer**” text field, at the top of the dialogue box, and type the number of seconds between data updates; e.g. <25>

PowerSuite Appearance

You can change the appearance the *PowerSuite* program window by selecting one of the radio buttons “**Default**”, “**Black**” or “**Windows XP**”.

Then, when you click on the “**OK**” button, the *PowerSuite*’s colour scheme will be changed.

Also, you can select between 2 battery bank profiles.

The system’s battery banks can be displayed in the Power Explorer pane in one of these profiles:

- **Bank view**
which displays dialogue boxes for the alarm monitors implemented for each battery bank

OR the

- **String view**
which displays dialogue boxes for the alarm monitors implemented for each battery string

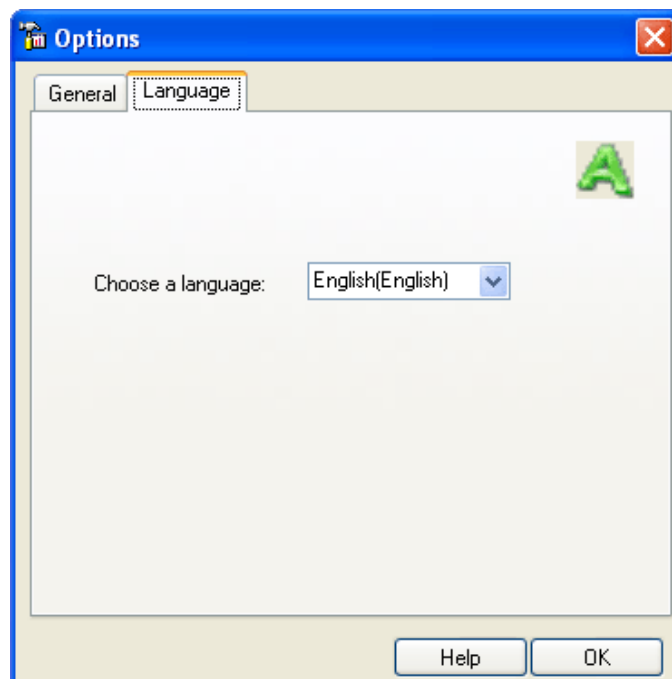
Read also about [Overview Battery Measurements](#) (page 295), in the [Functionality Description](#) section.

Also, refer to the “[String nn dialog box](#)” on page 133.

Language tab

If necessary, click on the “**Language**” tab, to show its data.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.



All the text in the *PowerSuite* menus, buttons, dialogue boxes, panes, etc can be displayed in one of several languages.

Do the following to select the *PowerSuite* application’s language:

- Click on the “**Choose a Language**” drop-down arrow, and select the language that you want to use with *PowerSuite*, e.g. <Spanish (Español)>

The default language is English.

Note that this function does not apply to the *PowerSuite* Online Help.

Import/Export Configuration dialog box

This dialog box is a “wizard”, which is displayed by selecting from the menu “**Tools > Import/Export Configuration**” or pressing shortcut key **F6**.

To import or export data you must log on to Service Access Level, read “[Log In dialog box](#)”, page 28.

The “wizard” will guide through the required steps to import configuration data from a file or connected control unit, and export the data to a file or to other control units of the same type.

You have the following import/export choices:

- Import from a **file** and export to **control unit(s)**
- Import from **control unit(s)** and export to a **file**
- Import from **control unit(s)** and export to **control unit(s)** of the same type

NOTICE: You can clone configuration data -- import data from control unit(s) and export data to other control unit(s) of the same type -- following the descriptions in this topic.

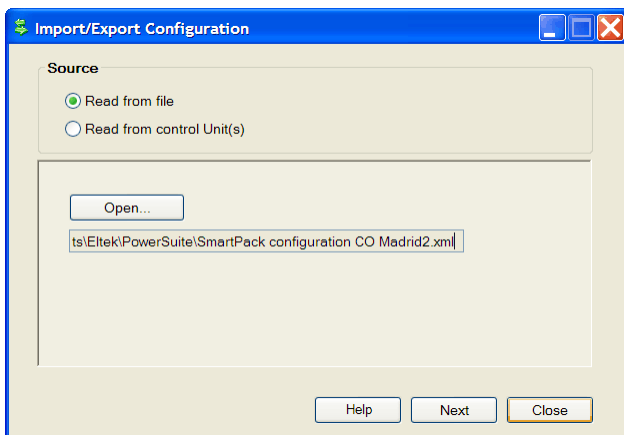
But, if you prefer, you can also clone data running the wizard twice:

- First time to read from the source control unit(s) and write the data to a file in the computer, then
- Disconnect from the source system and connect to the target system, and
- Second time to read from the file and write to the target control unit(s).

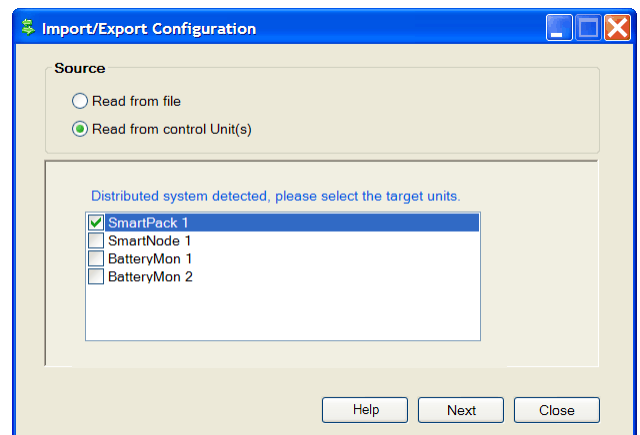
Start with “[Step 1, Select Import Source](#)” on page 34.

Step 1, Select Import Source

Depending on whether you want to import configuration data from a file or from a connected control unit, *PowerSuite* will display one of the following dialog boxes, where you can select where to import data from (source).



RF:
Dialog box displayed when **importing from a file**



RC:
Dialog box displayed when **importing from connected control unit(s)**

To “**Read from a file**” (source file) with configuration data, do following: (see dialog box “**RF**”)

- A. Click on radio button “**Read from file**”
- B. Click the **Open button** and **select the source file** from disc (XML format);
e.g. “Smartpack Configuration CO Madrid2.xml”
- C. Click on the “**Next**” button, to go to the next step
(data reading will not start at this step)

To “**Read from a Control Unit**” (source), the unit’s configuration data, do following: (see dialog box “**RC**”)

- A. Click on radio button “**Read from control Unit(s)**”
- B. Click to **check the control units** (or uncheck to ignore) that you want to import configuration data from;
e.g. from the “Smartpack 1”
- C. Click on the “**Next**” button, to go to the next step
(data reading will not start at this step)

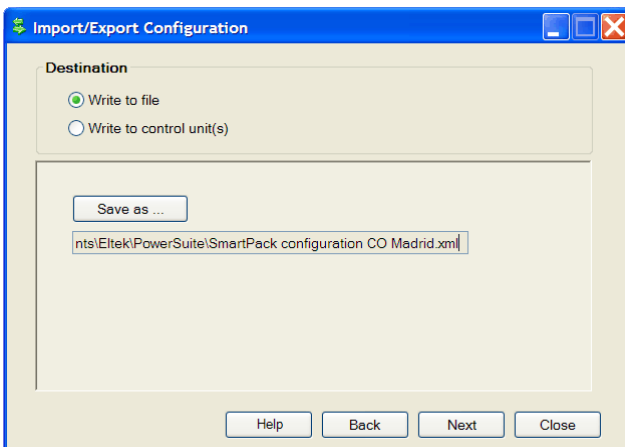
Clicking on the “**Close**” button will stop the wizard without importing or exporting any data.

NOTICE: The wizard enables you to import configuration data from many connected control units at the same time.

Continue with “[Step 2, Select Export Target](#)” on page 35.

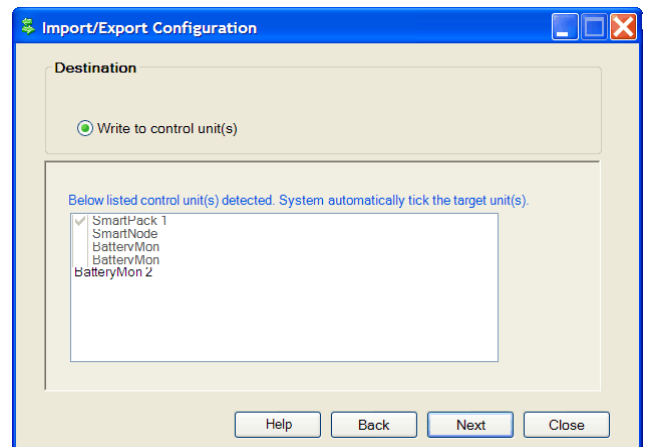
Step 2, Select Export Target

Depending on whether you want to export configuration data to a file or to a connected control unit, *PowerSuite* will display one of the following dialog boxes, where you can select where to export data (target).



WF:

Dialog box displayed when **exporting to a file**



WC:

Dialog box displayed when **exporting to connected control unit(s)**

To “**Write to a file**” (destination or target file) the configuration data selected in step 1, do following: (see dialog box “**WF**”)

- A. Click on radio button “**Write to file**”
- B. Click the “**Save as**” button, and
in the dialog box **type the name you want to give to the destination file**,
e.g. “Smartpack configuration CO Madrid”.
Do not change the type of file in the “Save as type” field.
- C. Click on the “**Next**” button, to go to the next step
(writing data will not start at this step)

To “**Write to Control Unit(s)**” (destination or target unit(s)) the configuration data selected in step 1, do following: (see dialog box “**WC**”)

- A. Click on radio button “**Write to control unit(s)**”
Note that *PowerSuite* automatically selects the type of connected control unit(s) that corresponds with the configuration data you selected in step 1
- B. Click on the “**Next**” button, to go to the next step
(writing data will not start at this step)

Clicking on the “**Close**” button will stop the wizard without importing or exporting any data.

NOTICE: The wizard enables you to export configuration data to many connected control units at the same time.

Continue with “[Step 3, Confirmation](#)” on page 36.

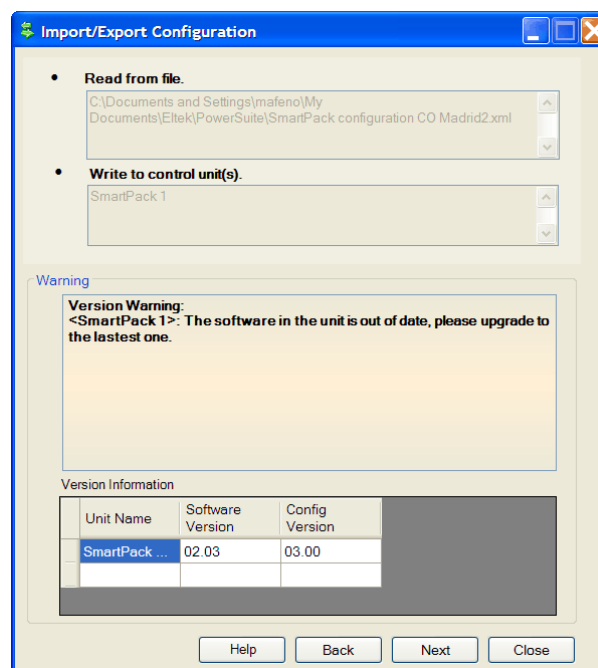
Step 3, Confirmation

Depending on the source and target selection you made in previous steps, *PowerSuite* will display one of the following dialog boxes, so that you can confirm that your selection of import-source and export-target are correct.

Select the actual import/export choices below for a description of the dialog boxes.

Then, continue with “[Step 4, Transfer Data](#)” on page 38.

Import from a file and export to control unit(s)



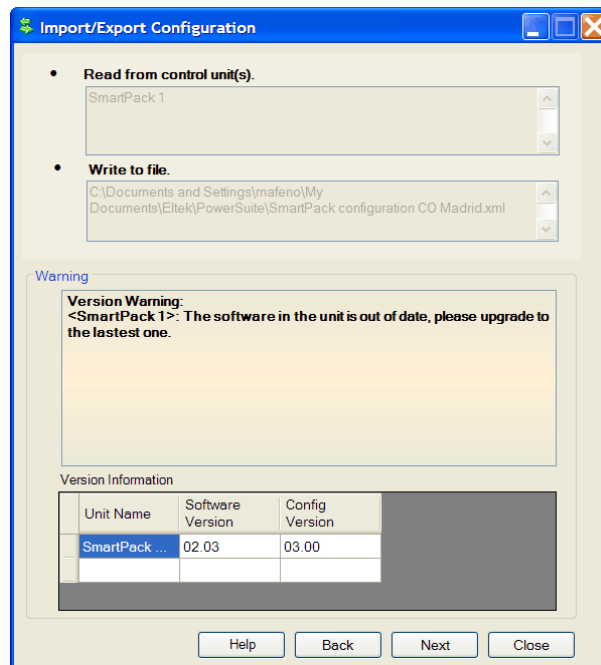
RFWC:

Dialog box displayed when **importing from file** and **exporting to connected control unit(s)**

To confirm that your selection of import-source and export-target is correct, do following:

- A. **Check** that the “**Read to...**” and “**Write to...**” information corresponds to where you want to import data from and where export data to.
E.g. correct file name and folder, correct type of control unit(s), no warnings to consider.
- B. If the information **is correct**, click on the “**Next**” button, to go to the next step, (importing and exporting configuration data **will then start!**).
OR
If the “**Read to...**” and “**Write to...**” information **is not correct**, click on the “**Back**” button, to go to previous steps to correct the selection.
OR
If you have **warnings to take care of** (e.g. upgrading control unit’s version, etc.), click on the “**Close**” button, to stop the wizard without importing or exporting any data.

Import from control unit(s) and export to a file



RCWF:

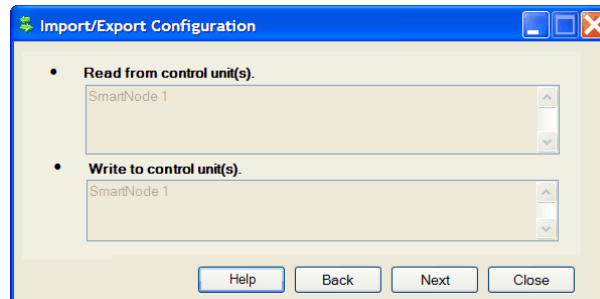
Dialog box displayed when **importing from control unit(s)** and **exporting to a file**

To confirm that your selection of import-source and export-target is correct, do following:

- A. **Check** that the “**Read to...**” and “**Write to...**” information corresponds to where you want to import data from and where export data to.
E.g. correct file name and folder, correct type of control unit(s), no warnings to consider.
- B. If the information **is correct**, click on the “**Next**” button, to go to the next step, (importing and exporting configuration data **will then start!**).
OR
If the “**Read to...**” and “**Write to...**” information **is not correct**, click on the “**Back**” button, to go to previous steps to correct the selection.
OR

If you have **warnings to take care of** (e.g. upgrading control unit's version, etc.), click on the **“Close” button**, to stop the wizard without importing or exporting any data.

Import from control unit(s) and export to control unit(s)



RCWC:

Dialog box displayed when **importing from control unit(s)** and **exporting to control unit(s)** of the same type

To confirm that your selection of import-source and export-target is correct, do following:

- A. **Check** that the **“Read to...”** and **“Write to...”** information corresponds to where you want to import data from and where export data to.
E.g. correct file name and folder, correct type of control unit(s), no warnings to consider.
- B. If the information **is correct**, click on the **“Next” button**, to go to the next step, (importing and exporting configuration data **will then start!**).
OR
If the **“Read to...”** and **“Write to...”** information **is not correct**, click on the **“Back” button**, to go to previous steps to correct the selection.
OR
If you have **warnings to take care of** (e.g. upgrading control unit's version, etc.), click on the **“Close” button**, to stop the wizard without importing or exporting any data.

Step 4, Transfer Data

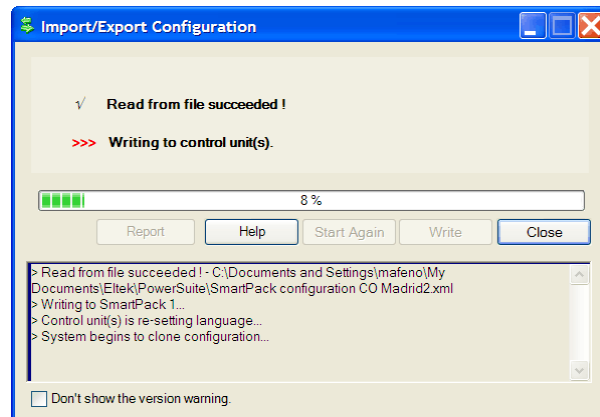
In this step, *PowerSuite* **starts to import** configuration data from the source you selected, and **to export the data** to the selected target.

Depending on the source and target selection you made in previous steps, *PowerSuite* will display the following dialog boxes.

Select the actual source/target choices below for a description of the dialog boxes.

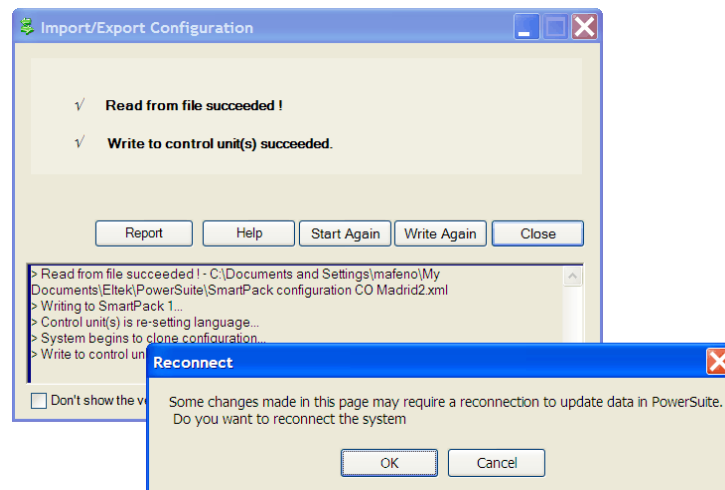
Then, you are finished transferring configuration data via the “wizard” in [“Import/Export Configuration dialog box”](#) on page 33.

Transfer from a file and to control unit(s)



RFWC1:

Dialog box displayed when the **import from file** and the **export to control unit(s)** has started



RFWC2:

Dialog box displayed when the **import from file** and the **export to control unit(s)** has terminated

- A. **Wait** while the configuration data is read from the source and written to the target.
The progress bar and the log area in the dialog box will indicate the progress status.
See actual dialog box “**xxxx1**”
- B. When the **importing and exporting of configuration data is terminated**, the log area of the actual dialog box “**xxxx2**” will display a summary of the performed actions, and the read and write actions are checked

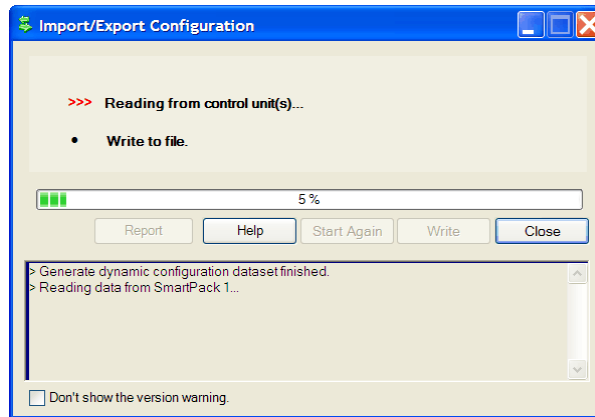
Clicking on the “**Close**” button will stop the wizard.

Clicking on the “**Write Again**” button will write the imported configuration data again to the target system.

Clicking on the “**Start Again**” button will restart the wizard, enabling to make the importing and exporting selections again.

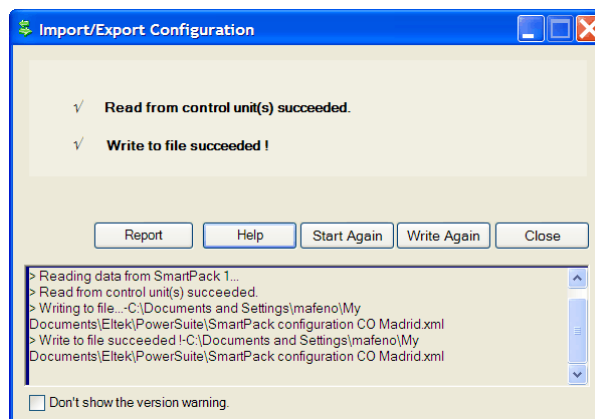
Clicking on the **“Report”** button will open (in your Acrobat Reader) a report in PDF format containing the transferred configuration data. Read also about [“Creating an Import/Export Data Report”](#) on page 43.

Transfer from control unit(s) and to a file



RCWF1:

Dialog box displayed when the **import from control unit(s)** and the **export to a file** has started



RCWF2:

Dialog box displayed when the **import from control unit(s)** and the **export to a file** has terminated

- A. **Wait** while the configuration data is read from the source and written to the target.
The progress bar and the log area in the dialog box will indicate the progress status.
See actual dialog box **“xxxx1”**
- B. When the **importing and exporting of configuration data is terminated**, the log area of the actual dialog box **“xxxx2”** will display a summary of the performed actions, and the read and write actions are checked

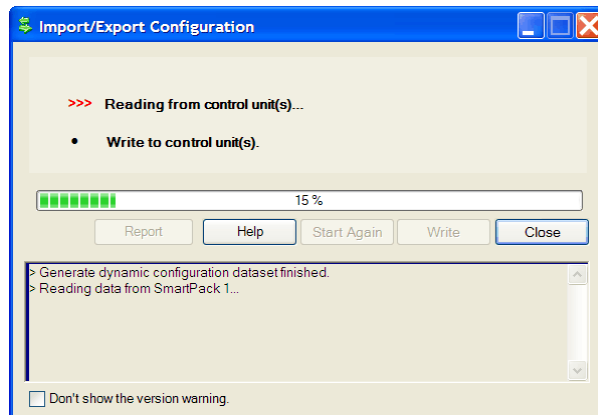
Clicking on the **“Close”** button will stop the wizard.

Clicking on the **“Write Again” button** will write the imported configuration data again to the target system.

Clicking on the **“Start Again” button** will restart the wizard, enabling to make the importing and exporting selections again.

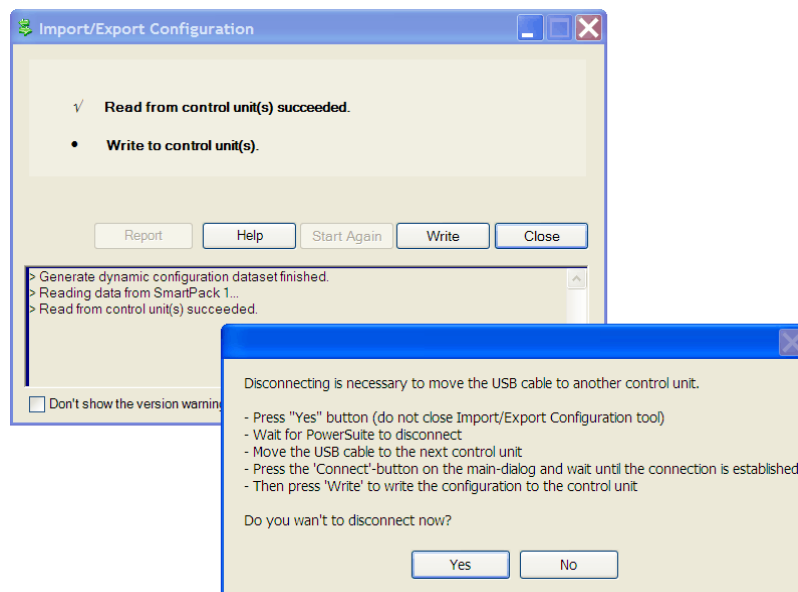
Clicking on the **“Report” button** will open (in your Acrobat Reader) a report in PDF format containing the transferred configuration data. Read also about [“Creating an Import/Export Data Report”](#) on page 43.

Transfer from control unit(s) and to control unit(s)



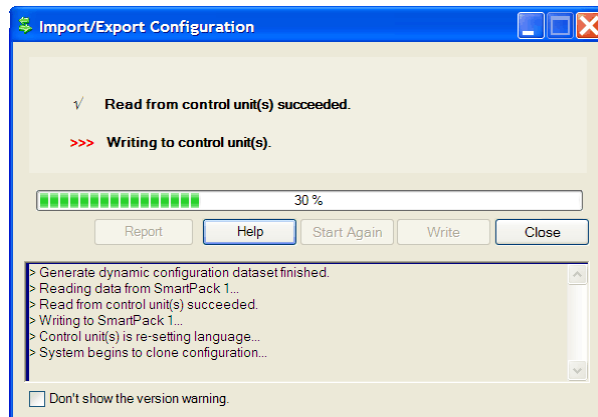
RCWC1:

Dialog box displayed when the **import from control unit(s)** has started



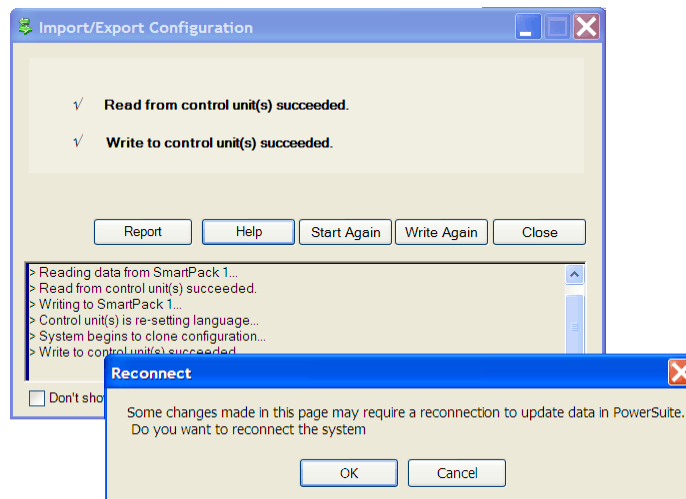
RCWC2:

Dialog box displayed when the import from control unit(s) has terminated, and **before starting the export to control unit(s)**



RCWC3:

Dialog box displayed when the import from control unit(s) has terminated and the **export to control unit(s)** has started



RCWC4:

Dialog box displayed when the **import from control unit(s)** and the **export to control unit(s)** has terminated

- A. **Wait** while the configuration **data is read** from the source power system.
The progress bar and the log area in the dialog box will indicate the progress status.
See actual dialog box “xxxx1”
- B. When the **importing of configuration data is terminated**, a new dialog box, “xxxx2”, asks you to disconnect the system.
 - 1.- **Write down the steps** described in the dialog box
 - 2.- **Click on the “Yes” button**, so that *PowerSuite* disconnects, and
 - 3.- **Carry out the rest of the steps** described in the dialog box

Note: The USB cable end -- disconnected from the source system controller -- is to be connected to the target system controller.

Note: After clicking on the “**Connect**” button on the *PowerSuite* toolbar, you need to log in with Service Access.

Note: The “**Write**” button is located in the opened “Import/Export” dialog box.

- C. **Wait** while the configuration **data is written** to the target power system.
The progress bar and the log area in the dialog box will indicate the progress status.
See actual dialog box “**xxxx3**”
- D. After the configuration data is written to the target system, a new dialog box, “**xxxx4**”, asks you to disconnect from the system, and connect again so that *PowerSuite* may update the displayed data.
- **Click on the “OK” button**, so that *PowerSuite* may reconnect.

Clicking on the “**Close**” button will stop the wizard.

Clicking on the “**Write Again**” button will write the imported configuration data again to the target system.

Clicking on the “**Start Again**” button will restart the wizard, enabling to make the importing and exporting selections again.

Clicking on the “**Report**” button will open (in your Acrobat Reader) a report in PDF format containing the transferred configuration data. Read also about “[Creating an Import/Export Data Report](#)” on page 43.

Creating an Import/Export Data Report

After *PowerSuite* has terminated importing configuration data from the source you selected, and exporting the data to the selected target, *PowerSuite* can create a **report of the configuration data in PDF format**.

Eltek-Valere

Report No.: 06297105411800_27052008 12:24:47

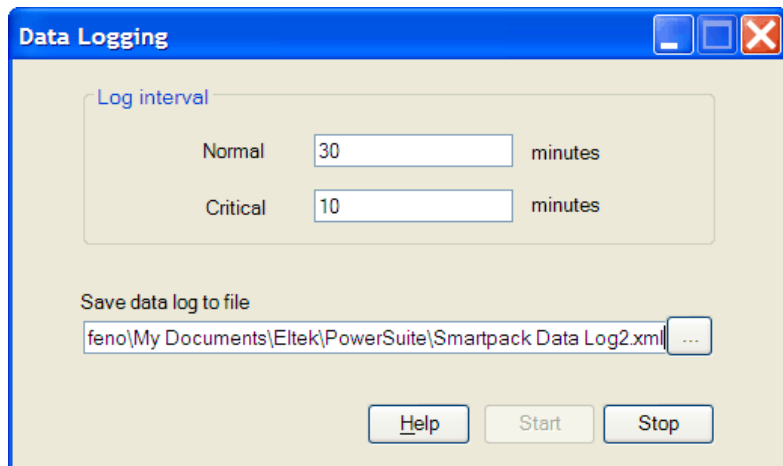
Control Units Configuration Report

Summary	
SmartPack Serial Number	06297105411800
PowerSuite Version	2.4q
Configuration File	SmartPack configuration CO Madrid.xml
Report Number	06297105411800_27052008 12:24:47
Date/Time	27/05-2008 12:24:47
User	ELTEK/MaFeMO
Machine name	EENO-MAFE
Sign	

category	result	failure line
Power System	Not Ok	6,354,355,356,357

Data Logging dialog box

This dialog box is displayed by selecting from the menu “**Tools > Data Logging**”.



The Data Logging dialog box enables you to configure *PowerSuite* to automatically request for the power system's parameters, and save them in a file (XML) on the computer.

To configure *PowerSuite* to periodically save a log of the power system's data, do following:

1. **Select the Log interval**, by clicking on the **Normal** text field, and typing how often (the number of minutes) *PowerSuite* will request for system data, while the system is NOT in a critical condition AND clicking on the **Critical** text field, and typing how often (the number of minutes) *PowerSuite* will request for system data, while the system is in a critical condition

Read more about [Power System's Operation Mode](#) (page 242), in the [Functionality Description](#) section

2. Click on the **"..." button**, and in the "Save data log to file" dialog box, type a file name and storage location in your computer for the data log
3. Click on the **"Start" button**, and *PowerSuite* will start requesting and saving system data in the file
Note:
Do not close the dialog box until you have stopped the data logging!
4. Click on the **"Stop" button**, when you want to stop the automatic data logging

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

The data log file in the computer will grow approximately 7MB annually, when the log interval is 30 minutes.

Read more in topic Type of Logs in PowerSuite (page **Error! Bookmark not defined.**) on the FAQs section.

Toolbar dialog boxes

This topic describes the dialogue boxes accessible from the *PowerSuite* toolbar. Refer to the ["Program Window"](#) on page 14.

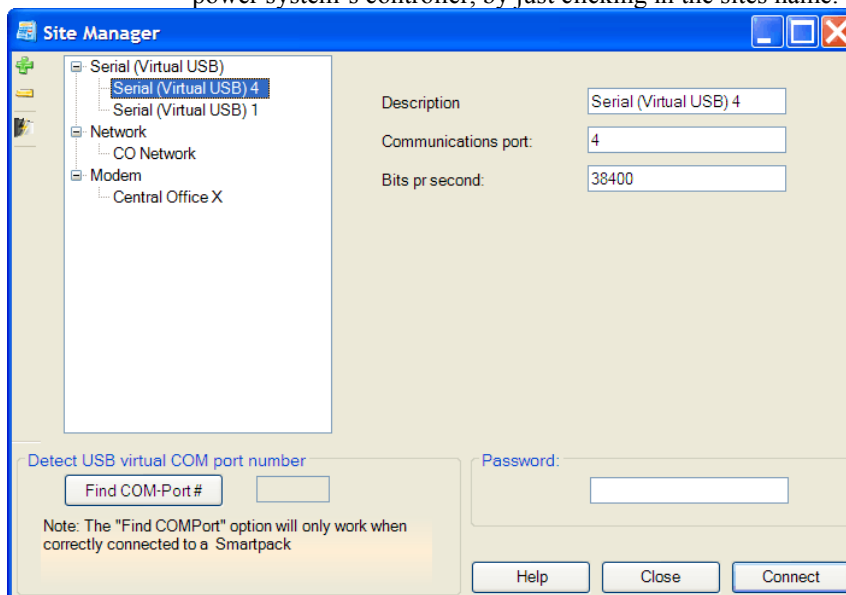
Read also a short description of the buttons on the ["The Toolbar"](#) on page 26.

Site Manager dialog box

This dialog box is displayed by clicking on the “**Connect**” button on “[The Toolbar](#)” on page 26, or selecting the “**Connect**” command on the “[Access Menu](#)” on page 21, or pressing shortcut key **F2**.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

The Site Manager dialog box enables you to start the communication with the power system’s controller, by just clicking in the sites name.



In general, to start the communication between *PowerSuite* and the local or remote located controller, do following:

1. **Select the Site**, by clicking on the actual site name (e.g. Serial (Virtual USB) 4). The communication data that your PC uses to communicate with the controller in this site is displayed on the dialog box’s right side
2. **Enter the password**, (if desired) by clicking in the password text field (on the lower right hand side) and typing the password for Service Access Level or Factory Access Level; refer to “[Access Levels](#)” on page 19
3. **Connect to the Site**, by clicking on the “**Connect**” button on the dialogue box. *PowerSuite* attempts connecting to the controller with the registered site’s connection data.

Note:

You can also connect to the “site “ without entering a password, and login in later using the “[Log In dialog box](#)” on page 28.

About Local or Remote Communication

Depending on how you connect the PC running *PowerSuite* to the power system’s controller, you have to configure *PowerSuite* with the correct communication parameters for the type of communication you have implemented.

You can save a set of communication parameters with a site name. Later, you can easily start the communication with the same power system, by just selecting the site name.

The PC running *PowerSuite* can communicate with the controllers of power systems sited,

- **Locally**, via a serial USB cable (“*Local Site*”)

OR

- **Remotely**, via an Ethernet network or via modem (“*Remote Site*”)

Find the COM Port Number

The “*Detect USB Virtual COM Port Number*” section, on the lower part of the dialogue box, is a tool for finding the COM port number the PC is using to communicate with the *Smartpack* controller.

This tool is **especially useful the first time** you start *PowerSuite*, and when the PC and the controller are not communicating.

You use the COM port number for configuring the serial communication parameters of the various “local sites”.

You can find the COM port number the PC is using by doing the following:

1. Switch the *Smartpack* controller ON, and connect the controller to the PC using a standard USB cable
2. Click on the “**Find COM Port #**” button
3. Make a **note the COM port number** displayed in the box, to the right of the button

If for example the number displayed in the box is <4>, it means that the PC uses COM4 to communicate with the controller.

Then, you enter number <4> in the “Communications Port” text field (on the Site Manager dialog box, on the right hand side), when you create and save this serial “*Local Site*” (a set of serial USB communication parameters).

Note:

If the COM port number is not displayed when you click on the “Find COM Port #” button, the reason could be that the PC is not correctly connected to the *Smartpack* controller.

Another way to find out which USB communication port is used by the *PowerSuite* application is by looking in the **Windows “Device Manager”**.

1. Right-click on “My Computer”
Select “Properties” - “Hardware” - “Device Manager”
Expand the “Ports (COM & LPT)” device
2. Jot down the USB communication port,
indicated in parenthesis at the end of the device “*Smartpack USB to UART Bridge controller*”
3. Start the *PowerSuite* application again, if necessary,
and try connecting again, entering the correct USB communication port (the one you jotted down)

Create a “Site”

To create a “site” means to save in *PowerSuite* the communication parameters with a name, so that you do not have to enter the parameters each time you want to connect to the system.

“Serial (Virtual USB)” Communication Parameters

Use serial USB communication when the *Smartpack* controller and the PC running *PowerSuite* are situated near each other.

Do following to create and save a set of serial USB communication parameters:

- Click on the “**Serial (Virtual USB)**” tree option, to select the type of communication data set to create
- Click on the “**Add Site**” icon (the green + icon); a new USB communication data set is created with the default name “Serial (Virtual USB) X”
- **Edit** the communication **parameters** by clicking on the text fields and typing:
 - In the “**Description**” field:
A suitable site name that describes the communication set; e.g. <Serial (Virtual USB) 2>
 - In “**Communications Port**” field:
The COM port number the PC uses to communicate with the controller.
If necessary, use the “Find COM port #” button in the “[Site Manager dialog box](#)” on page 45
 - In the “**Bits pr Second**” field:
Leave the default value suggested by *PowerSuite*, or enter another communication speed
- Click on the **Connect** button; to connect to the site

The set of communication parameters for this site is now created.

Go to the “[Site Manager dialog box](#)” on page 45, anytime to start communicating with the power system located in any of the configured sites.

“Network” Communication Parameters

Use Network communication when the controller and the PC running *PowerSuite* are situated far from each other, and an Ethernet network is available.

If your old *Smartpack* controller has no Web adapter embedded, you must connect the old *Smartpack* controller to the network via an external *WebPower* adapter. The *Compack* controller has always an embedded Web adapter.

You find more information about the external adapter in the *WebPower 3* manual (Doc 2019824), and about the embedded adapter in the *Smartpack* manual (Doc 350003.013).

Do following to create and save a set of Network communication parameters:

- Click on the “**Network**” tree option, to select the type of communication data set to create
- Click on the “**Add Site**” icon (the green + icon); a new Network communication data set is created with the default name “Network 1”
- **Edit** the communication **parameters**, by clicking on the text fields and typing:
 - In the “**Description**” field:
A suitable site name that describes the communication set; e.g. <CO MDF Network>

- In “**Control Unit IP address**” field:
The controller’s IP address, or the IP address of the external Web adapter connected to the *Smartpack* controller
- In the “**PC port #**” and “**Control unit port #**” fields:
Leave the default value suggested by *PowerSuite*
- Click on the **Connect** button;
to connect to the site

The set of communication parameters for this site is now created.

Go to the “[Site Manager dialog box](#)” on page 45, anytime to start communicating with the power system located in any of the configured sites.

“Modem” Communication Parameters

Use Modem communication when the *Smartpack* controller and the PC running *PowerSuite* are situated far from each other, and they are connected via modems.

Do following to create and save a set of Modem communication parameters:

- Click on the “**Modem**” tree option,
to select the type of communication data set to create
- Click on the “**Add Site**” icon (the green + icon);
a new Modem communication data set is created with the default name “Modem 1”
- **Edit** the communication **parameters**, by clicking on the text fields and typing:
 - In the “**Description**” field:
A suitable site name that describes the communication set; e.g. <Central Office X>
 - In “**Phone number**” field:
The phone number of the remote modem connected to the *Smartpack* controller, e.g. <+4732560074>
 - In the “**Phone Line**” drop-down list:
select the type of modem connected to the *PowerSuite* computer, e.g. <Conexant HDA D330 MDC V.92 Modem>
The “**Properties**” button enables you to see and change the properties of the installed modems in the computer. Notice that the correct type of modem(s) have to be installed in the computer in advance
 - Click on the **Connect** button;
to connect to the site

The set of communication parameters for this site is now created.

Go to the “[Site Manager dialog box](#)” on page 45, anytime to start communicating with the power system located in any of the configured sites.

Delete a “Site”

Do following to delete a previously created site (a set of communication parameters):

- Click on the **site name** in the tree,
e.g. on the name <Serial (Virtual USB) 6>
- Click on the “**Delete Site**” icon (the yellow “-” icon)

- Click on the “**OK**” button, on the “Delete Site?” dialog box

The set of communication parameters for this site is now deleted.

Go to the “[Site Manager dialog box](#)” on page 45, anytime to start communicating with the power system located in any of the configured sites.

Create a Shortcut Icon of a “Site”

You can create a shortcut icon on the computer desktop for every previously created sites.

The shortcut icons on the computer desktop will display the site name, thus enabling you to click on them to automatically start *PowerSuite* and connect to the actual site.

Do following to create a shortcut icon on the computer desktop for a previously created site (a set of communication parameters):

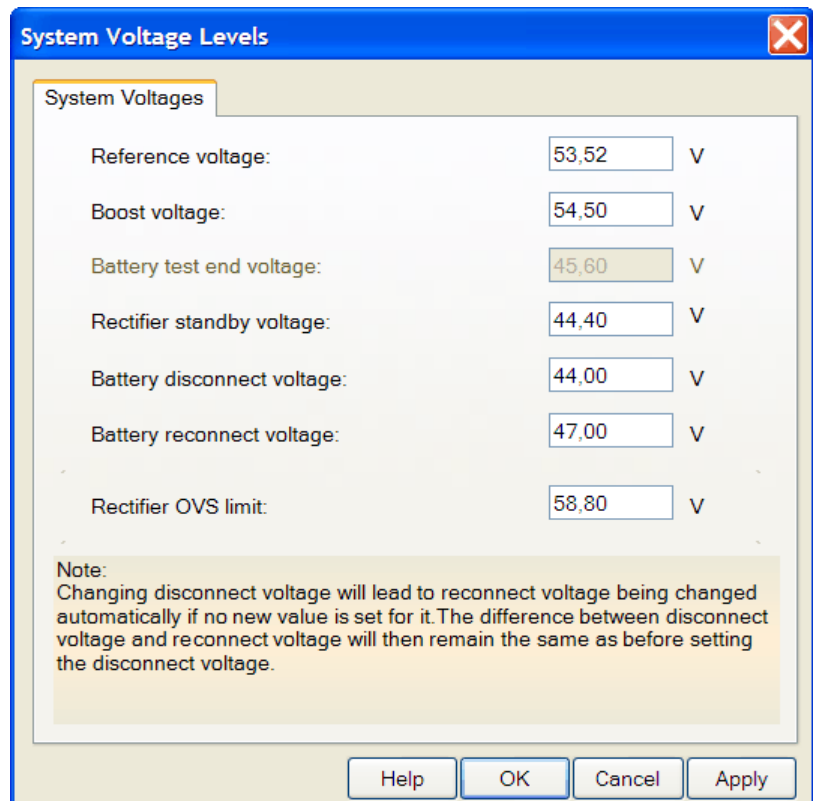
- Click on the **site name** in the tree, e.g. on the name <Serial (Virtual USB) 4>
- Click on the “**Create Shortcut**” icon (the *PowerSuite* logo icon)

The shortcut for this site is now created on the computer desktop.

Go to the “[Site Manager dialog box](#)” on page 45, anytime to start communicating with the power system located in any of the configured sites, or click on the site’s shortcut icon on the PC’s desktop.

System Voltage Levels dialog box

This dialog box is displayed by clicking on the “**System Voltage Levels**” button, on “[The Toolbar](#)” on page 26.



The dialog box titled "System Voltage Levels" contains a tab labeled "System Voltages". It lists seven voltage parameters, each with a text input field and a unit "V". The values are: Reference voltage: 53,52; Boost voltage: 54,50; Battery test end voltage: 45,60; Rectifier standby voltage: 44,40; Battery disconnect voltage: 44,00; Battery reconnect voltage: 47,00; and Rectifier OVS limit: 58,80. A note at the bottom states: "Note: Changing disconnect voltage will lead to reconnect voltage being changed automatically if no new value is set for it. The difference between disconnect voltage and reconnect voltage will then remain the same as before setting the disconnect voltage." At the bottom right are buttons for Help, OK, Cancel, and Apply.

Parameter	Value	Unit
Reference voltage:	53,52	V
Boost voltage:	54,50	V
Battery test end voltage:	45,60	V
Rectifier standby voltage:	44,40	V
Battery disconnect voltage:	44,00	V
Battery reconnect voltage:	47,00	V
Rectifier OVS limit:	58,80	V

Note:
Changing disconnect voltage will lead to reconnect voltage being changed automatically if no new value is set for it. The difference between disconnect voltage and reconnect voltage will then remain the same as before setting the disconnect voltage.

This dialog box presents you with a summary of the most important voltage parameters in the power system, allowing you to edit the values.

- If required, **edit the voltage parameters** by clicking on the text fields and typing other values
- **Click on the Apply button**, to save the changes

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Reference Voltage:

read more in the Battery dialog box, in the "[Configuration tab](#)" on page 107.

Boost Voltage:

read more in the Battery dialog box, in the "[Boost tab](#)" on page 117

Battery Test End Voltage:

This parameter is not editable. It is calculated from the end-voltage per cell that you may enter in the Battery dialog box, in the "[Test tab](#)" on page 110

Rectifier Standby Voltage:

read more in the "[Rectifier Overview dialog box](#)" on page 92

Battery Disconnect and Reconnect Voltages:

read more in the "[LVBD dialog box](#)" on page 134

Rectifier OVS limit:

read more in the Rectifiers dialog box, in the "[Configuration tab](#)" on page 85

System Configuration dialog box

This dialog box is displayed by clicking on the "System Configuration" button, on "[The Toolbar](#)" on page 26.

The configuration of the main parameters applying to the whole DC power system is gathered in this dialogue box.

NOTICE: Some of the changes in this dialog box may require that *PowerSuite* updates the data by reconnecting to the system controller. Click “OK” to allow *PowerSuite* to automatically reconnect -- if a new dialog box asks you for permission, after clicking on the “Apply” button.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

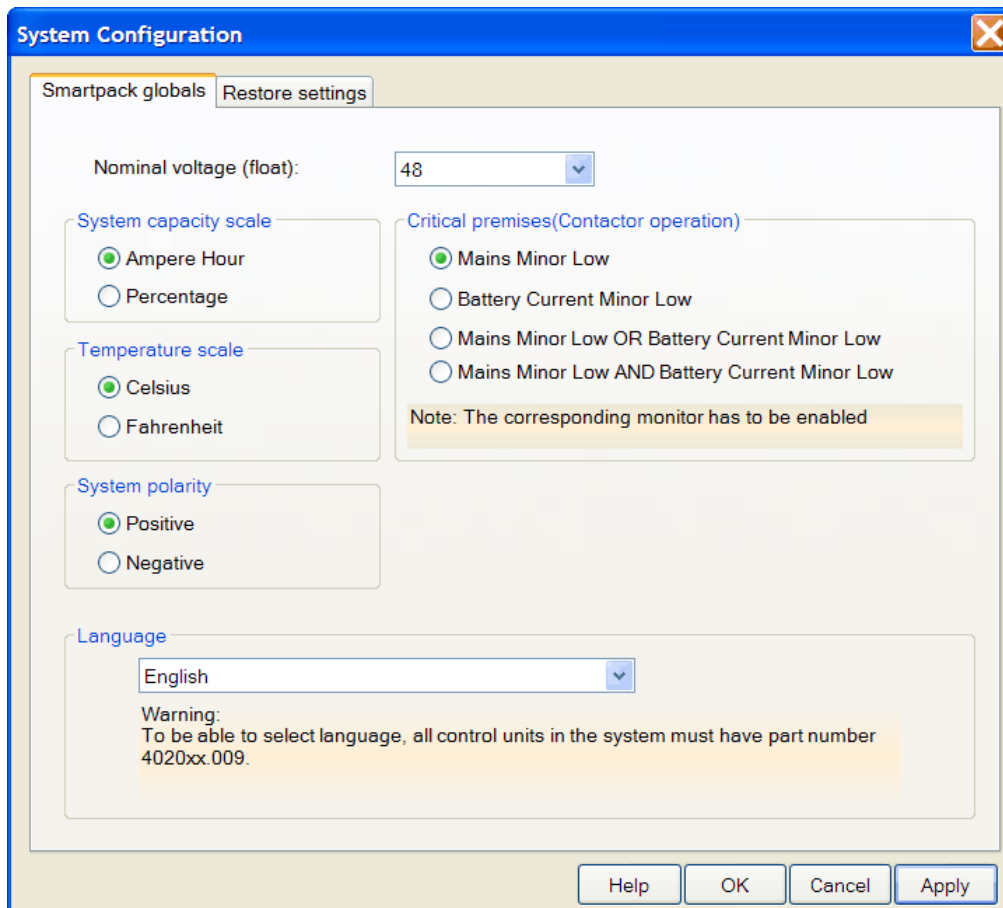
Click on the actual tab to display its data.

The screenshot shows the 'System Configuration' dialog box with the 'Smartpack globals' tab selected. The 'Restore settings' button is visible. The 'Nominal voltage (float)' is set to 48. Under 'System capacity scale', 'Ampere Hour' is selected. Under 'Temperature scale', 'Celsius' is selected. Under 'System polarity', 'Positive' is selected. Under 'Critical premises(Contactor operation)', 'Mains Minor Low' is selected. A note states: 'Note: The corresponding monitor has to be enabled'. A warning message at the bottom reads: 'Warning: To be able to select language, all control units in the system must have part number 4020xx.009'. The 'Language' dropdown is set to 'English'. At the bottom are buttons for 'Help', 'OK', 'Cancel', and 'Apply'.

Smartpack Globals tab

Click on the “**Smartpack Globals**” tab, to show its data.

This dialogue box enables you to configure the global system parameters, applying for the whole DC power system.



- In the “**Nominal Voltage (float)**” section, click on the drop-down arrow, and select the nominal float voltage of the power system, e.g. 48V, 24V or 60V
- In the “**System Capacity Scale**” section, click to select whether you want that the system battery’s remaining capacity -- measured by alarm monitors “BatteryRemCap” and “BatteryTimeLeft”-- .is expressed in **Ampere-Hours** or in **Percentage**. Read more in the Battery dialog box, in the “[Status tab](#)” on page 105
- In the “**Temperature Scale**” section, click to select whether you want that the system battery’s temperature -- measured by alarm monitor “BatteryTemp” -- .is expressed in **degrees Celsius** or in **Fahrenheit**. Read more in the Battery dialog box, in the “[Status tab](#)” on page 105
- In the “**System Polarity**” section,
 - Click to select “**Negative**”, if you want that the *Smartpack* controller displays negative voltages as negative values in Negative DC Distribution Systems
E.g. <-48V> will be displayed as <-48V>
Notice that in Positive DC Distribution Systems the values will be displayed as positive voltages.
 - Click to select “**Positive**”, if you want that the *Smartpack* controller displays negative voltages as positive values in *Negative DC Distribution Systems* (48V and 60V DC supply systems).
E.g. <-48V> will be displayed as <48V>
- In the “**Critical Premises (Contactor Operation)**” section, click to select which of the four circumstances (monitors in alarm) the DC power system has to encounter for the system to be in critical

condition.

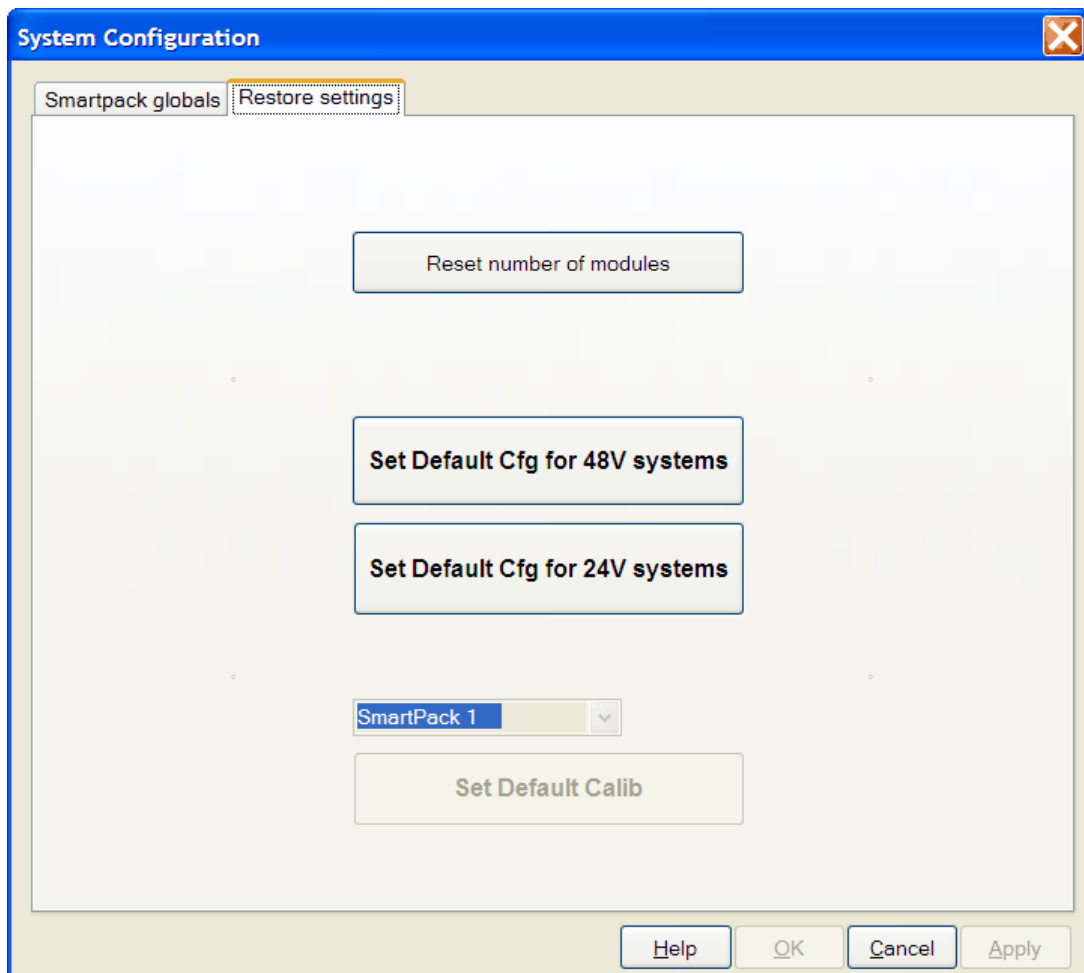
Read the topic [Power System's Operation Mode](#) (page 242) for more information.

- In the “**Language**” section, click on the drop-down arrow, and select the language you want to use in the controller's display
- And
Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Restore Settings tab

Click on the “**Restore Settings**” tab, to show its data.



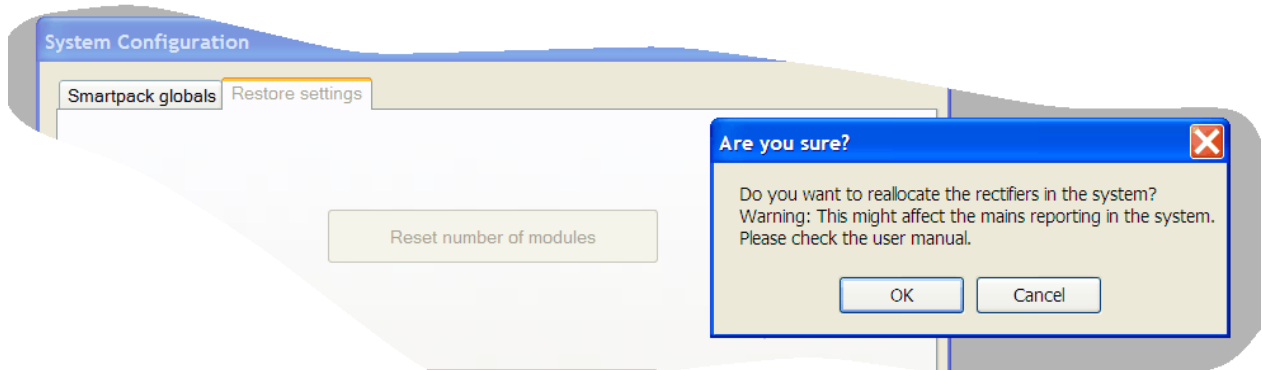
This dialogue box enables you to reset the global system parameters and settings to their default values (factory settings).

NOTICE: Contact your closest *Eltek* system engineer, if you need to reset the system's calibrations for shunts, temperature, etc. to Default Calibration (Set Default Calib)

- **Click on the actual button** to reset the configuration settings.
(click on the links below for a description)

Reset Number of Modules

Clicking on the “Reset Number of modules” button will carry out the following actions:



- Display a confirmation dialog box. Click OK to continue.
- The system controller “forgets” the number of registered control units and rectifiers
- The system controller “interrogates” again all control units and rectifiers connected to the CAN bus
- The system controller registers the number of control units and rectifiers, as well as their properties
- The tree in the Power Explorer pane is reset and updated with the connected units

Consider also the command “Search for New Units” in the [“Tools Menu”](#) on page 21.

Set Default Configuration for 48V Systems

Clicking on the “Set Default Cfg for 48V Systems” button will reset all the actual configuration parameters to match 48V power systems.

A confirmation dialog box will be displayed. Click on the OK button to continue.

Set Default Configuration for 24V Systems

Clicking on the “Set Default Cfg for 24V Systems” button will reset all the actual configuration parameters to match 24V power systems.

A confirmation dialog box will be displayed. Click on the OK button to continue.

Battery Test Results button

Clicking on the “**Battery Test Results**” button on the [“The Toolbar”](#) on page 26, will display the [“Battery Test Results dialog box”](#) on page 138. The topic describes other ways of displaying the dialogue box,

Event Log button

Clicking on the “**Event Log**” button on the “[The Toolbar](#)” on page 26, will display the “[Control System Event Log tab](#)” on page 142.

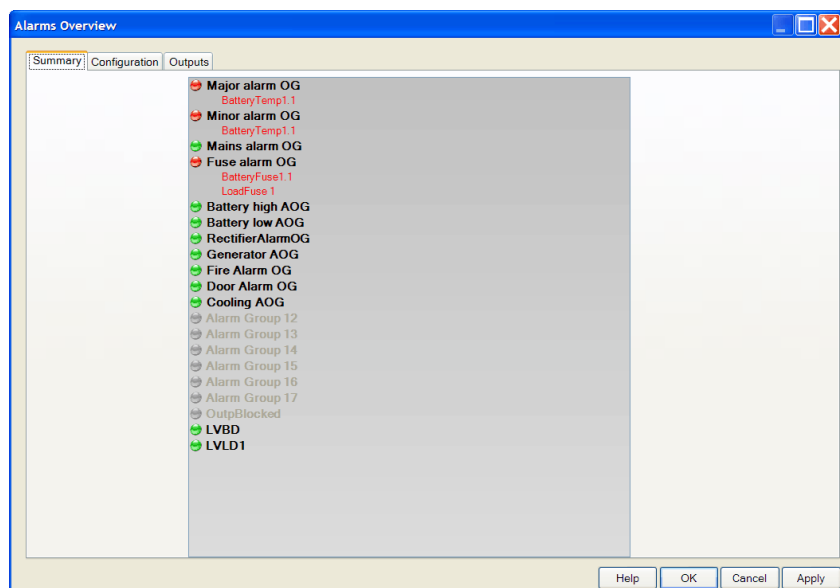
Read more in topic Type of Logs in PowerSuite (page **Error! Bookmark not defined.**) on the FAQs section. The topic describes other ways of displaying the dialogue box.

Alarms Overview dialog box

This dialog box is displayed by clicking on the “**Alarms Overview**” button, on “[The Toolbar](#)” on page 26.

This dialogue box gathers the power system’s alarm related issues, such as:

- Overview of all alarm group status, and the alarm monitors triggering alarms
- Drag-and-drop configuration of all the alarm monitors’ events to Alarm Output Groups, with a list of unassigned alarm monitors’ events
- Definition of Alarm Output Groups, and assignment of relay outputs to Alarm Output Groups



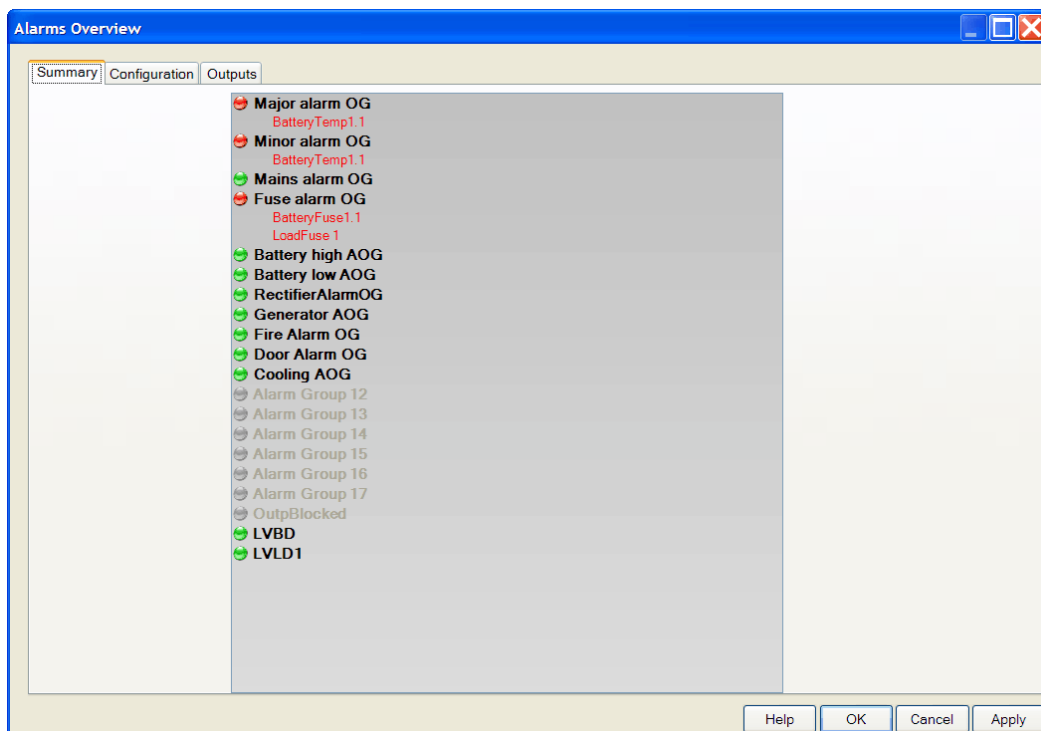
Alarms Overview Summary tab

Click on the “**Summary**” tab, to show its data.

This tab presents you a non-editable tree with an overview of all Alarm Output Groups and their status, as well as the alarm monitors triggering the alarms.

The Alarm Output Group’s tree is not editable, but you can:

- **Double-click on the Alarm Output Groups** that are in alarm state, to expand or collapse the groups, and display the alarm monitors triggering the alarms
- And
Click on the **Cancel** button, or on the **OK** button (the data is not editable)



Read more about [Alarm Monitors](#) (page 324) and [Alarm Output Groups](#) (page 328), in the [Functionality Description](#) section.

For information about the Alarm Output Groups' colour codes, read "[Power Explorer pane \(1\)](#)" on page 15.

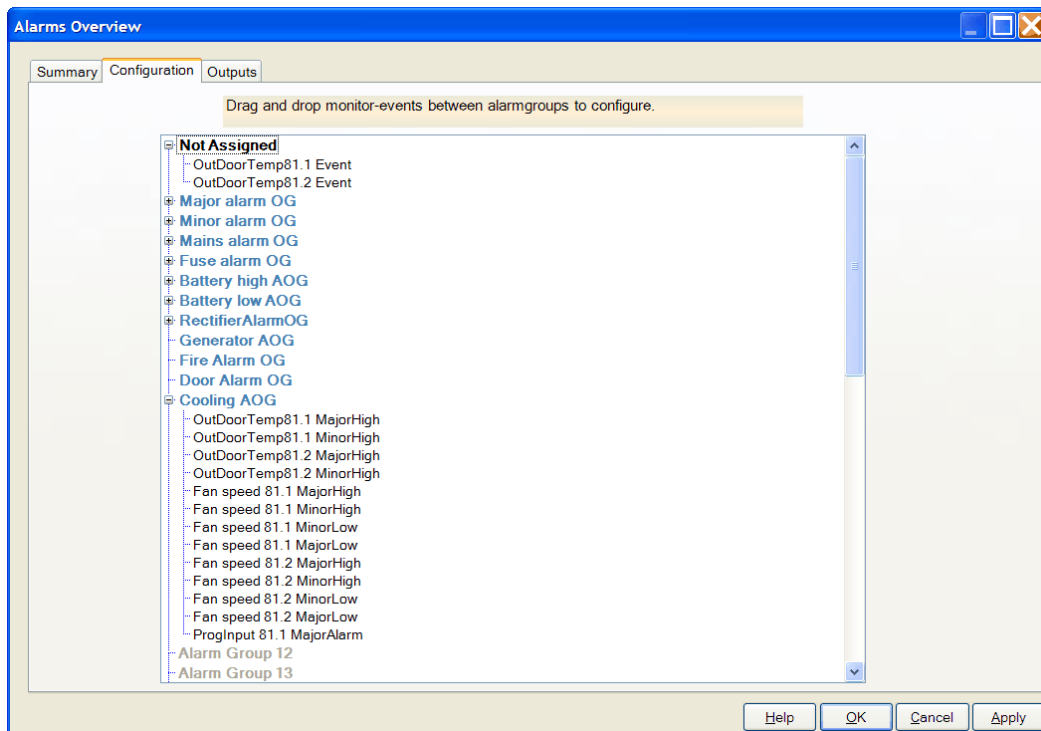
<<< [Back to dialog box "Alarms Overview dialog box"](#) on page 55.

Alarms Overview Configuration tab

Click on the "**Configuration**" tab, to show its data.

This tab presents you a tree with all Alarm Output Groups and all the assigned and unassigned alarm monitor events.

NOTICE: You can also assign any alarm monitor event to any Alarm Output Group, from the specific alarm monitor dialog box.
E.g. Clicking on the "ProgInput 81.1" alarm monitor link -- that you find in the "[Control Unit Input Handler tab](#)" on page 147 -- and selecting event "Major Alarm" and Alarm Output Group "Cooling AOG".



The Alarm Output Groups are displayed with blue text, e.g. the “Cooling AOG”.

The alarm monitor events are displayed in black text, with the name of the alarm monitor at the beginning (e.g. OutDoorTemp81.1), and the event name afterwards, in the same line (e.g. “MajorHigh”).

In this example, you see that Alarm Output Group “Cooling AOG” may be triggered by 13 alarm monitor events:

- By a “MajorHigh” event and a “MinorHigh” event, both in alarm monitor “OutdoorTemp81.1”
- By a “MajorHigh” event and a “MinorHigh” event, both in alarm monitor “OutdoorTemp81.2”
- Etc.

In this example, you also see that in the “Not Assigned” group there are two alarm monitor events that are not yet assigned: the “Event” event in alarm monitor “OutdoorTemp81.1” and “Event” event in alarm monitor “OutdoorTemp81.2”.

For information about how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

Read more about [Alarm Monitors](#) (page 324) and [Alarm Output Groups](#) (page 328), in the [Functionality Description](#) section.

<<< Back to dialog box “[Alarms Overview dialog box](#)” on page 55.

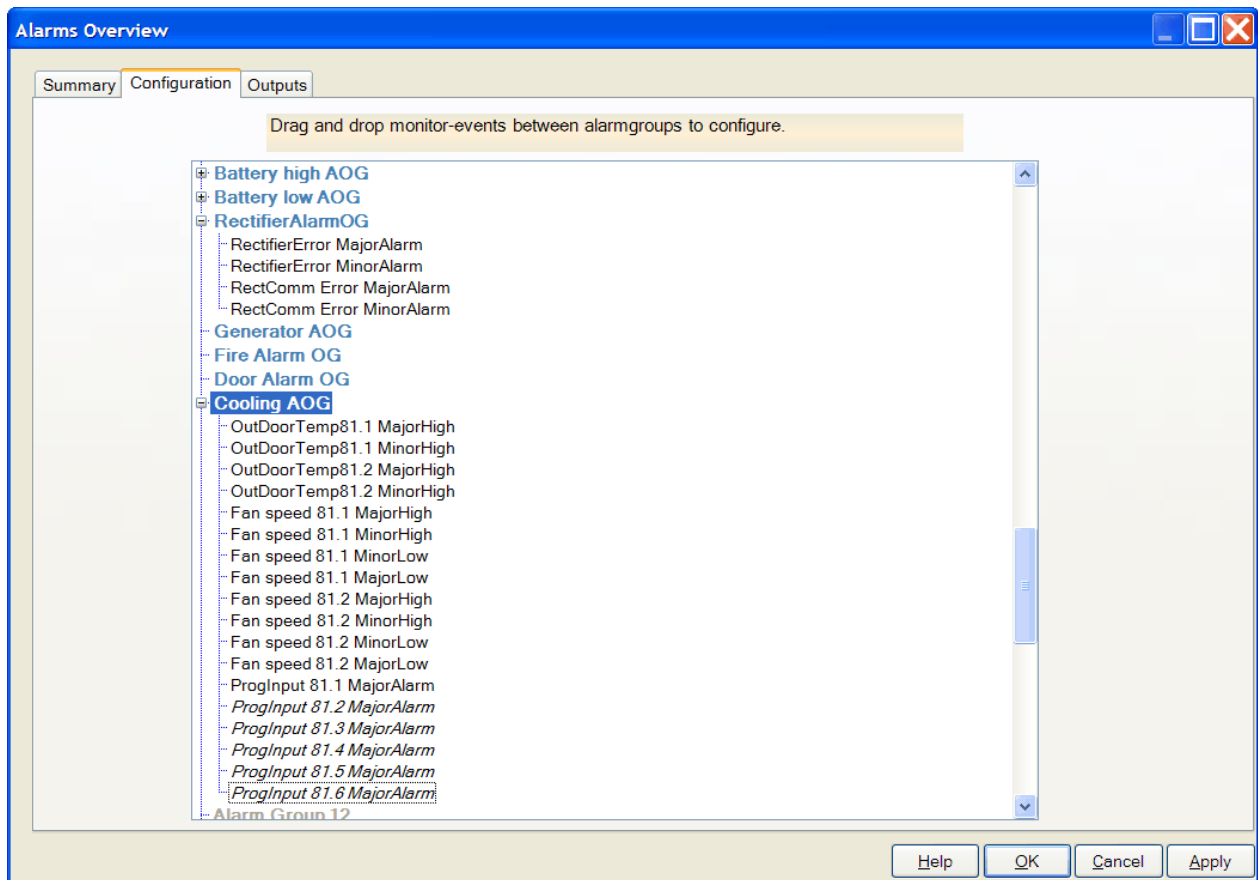
Assigning Alarm Monitor Events to Alarm Output Groups

To reassign alarm monitor events to Alarm Output Group, do following:

WARNING:

The power system should operate in normal condition, before you assign alarm monitor events to alarm output groups. Also, all the alarm

monitors and alarm output groups to be assigned must NOT be in alarm status.



- **Click** to select an **alarm monitor event**.
The alarm monitor event background colour changes, to indicate the selection
- **Drag** the selected **event** to the name of the **Alarm Output Group** that you want to assign it to.
The Alarm Output Group name's background colour changes to show you where you are about to drop the alarm monitor event.
After the drop, the font of the alarm monitor event's name changes to italics, to show you the assignment.

In this example, the event “Major Alarm” in the “ProgInput81.1” alarm monitor has been dropped in Alarm Output Group “Cooling AOG”, together with 4 other events.

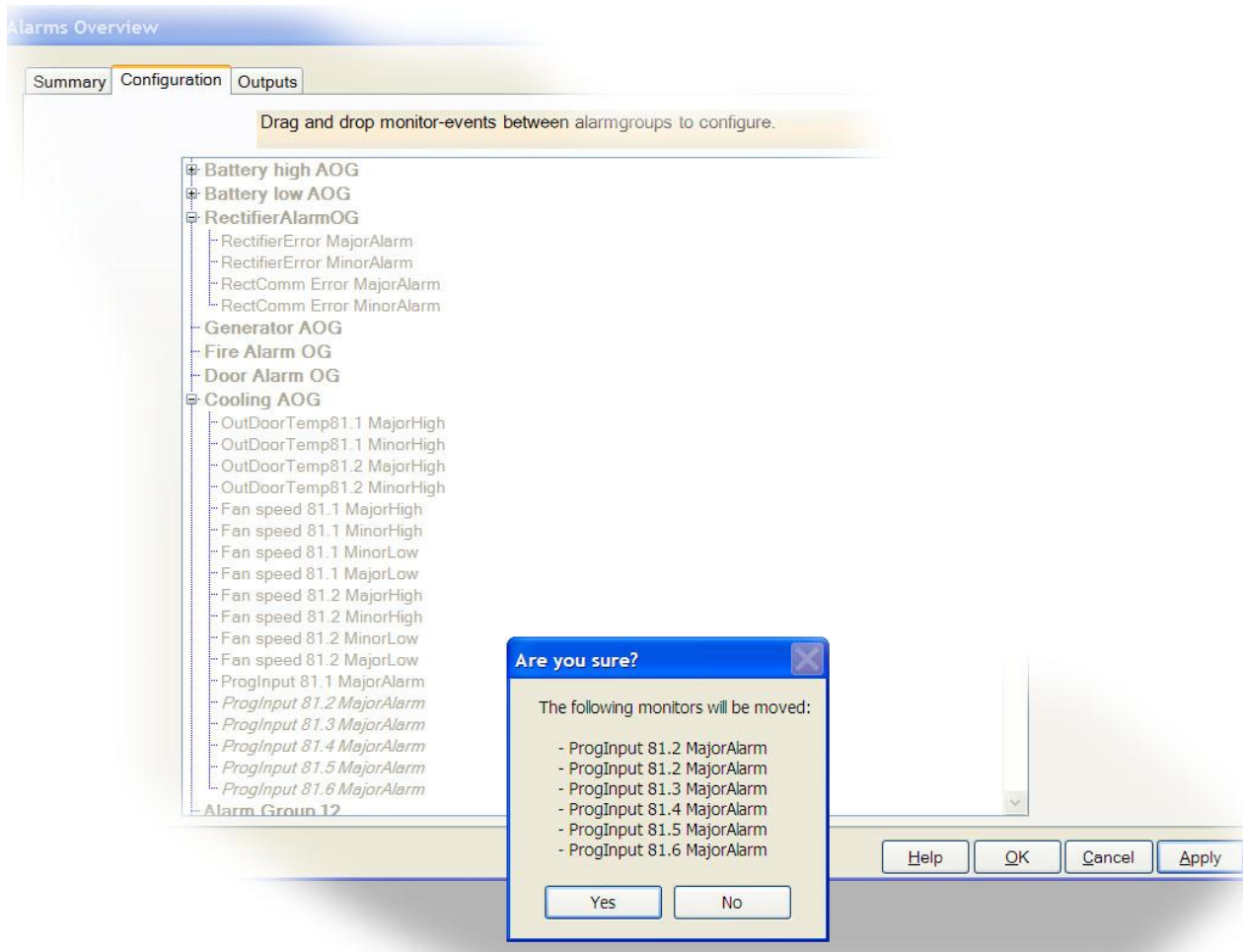
- Click on the **Apply** button to start the reassignment process.
A confirmation dialog box (see figure below) shows you a list of all the alarm monitor events that will be moved (reassigned), and asks you to **confirm the assignment**.
- If you are sure that you want to reassign all the listed events, **click on the Yes button** to activate the changes and update the Alarm Output Group tree,

OR

If you do not want to reassign some of the events (e.g. due to inaccurate drag-and-drop action), **click on the NO button** to ignore all the drag-

and-drop actions (reassignments), and restart the assignment.

- And
Click on the **OK** button, to close the dialog box



<<< Back to dialog box "[Alarms Overview Configuration tab](#)" on page 56.

Alarms Overview Outputs tab

Click on the "**Outputs**" tab, to show its data.

This dialog box enables you to define Alarm Output Groups for the whole power system, and assign the control unit's relay outputs to Alarm Output Groups.

NOTICE: To edit Alarm Output Groups' assignments, you have to be logged in with the Service Access Level password, read "[Log In dialog box](#)", page 28.

To edit the Alarm Output Groups "LVBD OG" and "LVLD1 OG" you have to be logged in with the Factory Access Level password.

Alarm group	Relay Output 1	Relay Output 2	Ba	Lo	Alarm output3	Alarm output4	Alarm output5	Alarm output6	Counter
Major alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	1
Minor alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	1
Mains alarm OG	☒	☒	☐	☐	☐	☐	☐	☐	0
Fuse alarm OG	☒	☐	☐	☐	☒	☐	☐	☐	2
Battery high AOG	☒	☐	☐	☐	☐	☒	☐	☐	0
Battery low AOG	☒	☐	☐	☐	☐	☐	☒	☐	0
RectifierAlarmOG	☒	☐	☐	☐	☐	☐	☐	☒	0
Generator AOG	☒	☒	☐	☐	☐	☐	☐	☐	0
Fire Alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	0
Door Alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	0
Cooling AOG	☒	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 12	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 13	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 14	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 15	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 16	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 17	☐	☐	☐	☐	☐	☐	☐	☐	0
OutpBlocked	☐	☐	☐	☐	☐	☐	☐	☐	0
LVBD	☐	☐	☒	☐	☐	☐	☐	☐	0
LVLDT1	☐	☐	☐	☒	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0

Each row in the *Outputs* tab displays one Alarm Output Group (AOG). Empty rows are used for DC power supply system with several controllers.

The **first column** shows the Alarm Output Group’s name. The **check boxes** on the columns to the right represent the alarm outputs – relays, latching contactors or telephone numbers -- assigned (checked) to the group. Unchecked alarm outputs are not assigned. All the alarm outputs implemented in the selected control unit are displayed to the right of the *Alarm group* column.

The “**Counter**” column displays the number of alarm monitors (assigned to each Alarm Output Group) that are in alarm state.

Read more about [Alarm Output Groups](#) (page 328), in the [Functionality Description](#) section.

NOTICE: The “Alarm Group” column displays all the Alarm Output Groups in the power system. The other columns present the outputs of the selected control unit, e.g. Alarm Relay Outputs for controllers and I/O Monitors (outdoor), and Phone Numbers for Smartnode control units.

Read also tutorial “[How to Configure Alarm Output Groups](#)” on page 174.

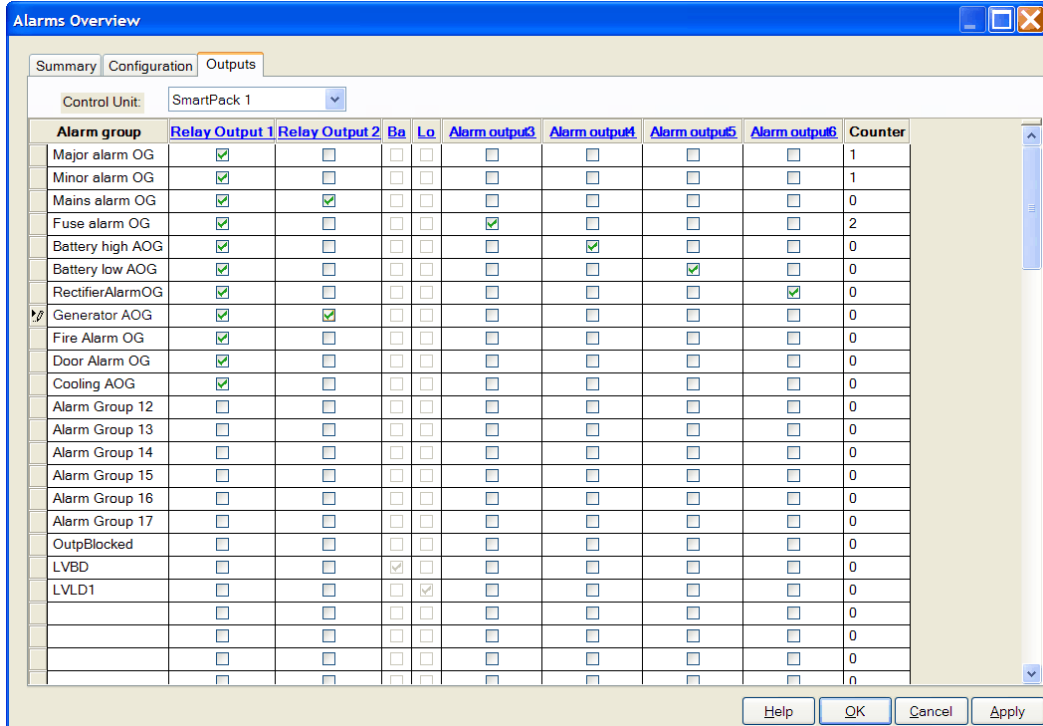
To assign a control unit’s relay outputs to the system’s Alarm Output Groups, select the control unit as follows:

- Click on the “Control Unit” drop-down arrow and **select the control unit** you want to configure.
The displayed columns represent the control unit’s physical outputs

<<< [Back to dialog box “Alarms Overview dialog box” on page 55.](#)

Click on the links below for further description.

Editing Alarm Output Group's Name and Output Assignments



To edit the name of the Alarm Output Group, do following:

1. **Click on the Alarm Output Group's name**, in the first column, to insert the cursor in the name
2. **Edit the group's name.**
An editing icon (pencil) is displayed while in editing mode

To change the alarm outputs – relays, latching contactors or telephone numbers - - that are assigned to an Alarm Output Group, do following:

On the Alarm Output Group's row that you want to edit,

3. **Click on the check box** for the actual alarm output (relay or phone number) that you want to assign to the group.
The boxes are of the ON/OFF type: click on the box to check it; click again to uncheck it.
For example: in the figure, “Relay Output 2” is assigned to the Alarm Output Group “Generator AOG”, as the box is checked. You could click on the “Relay Output 2” box to unchecked.
4. And
Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

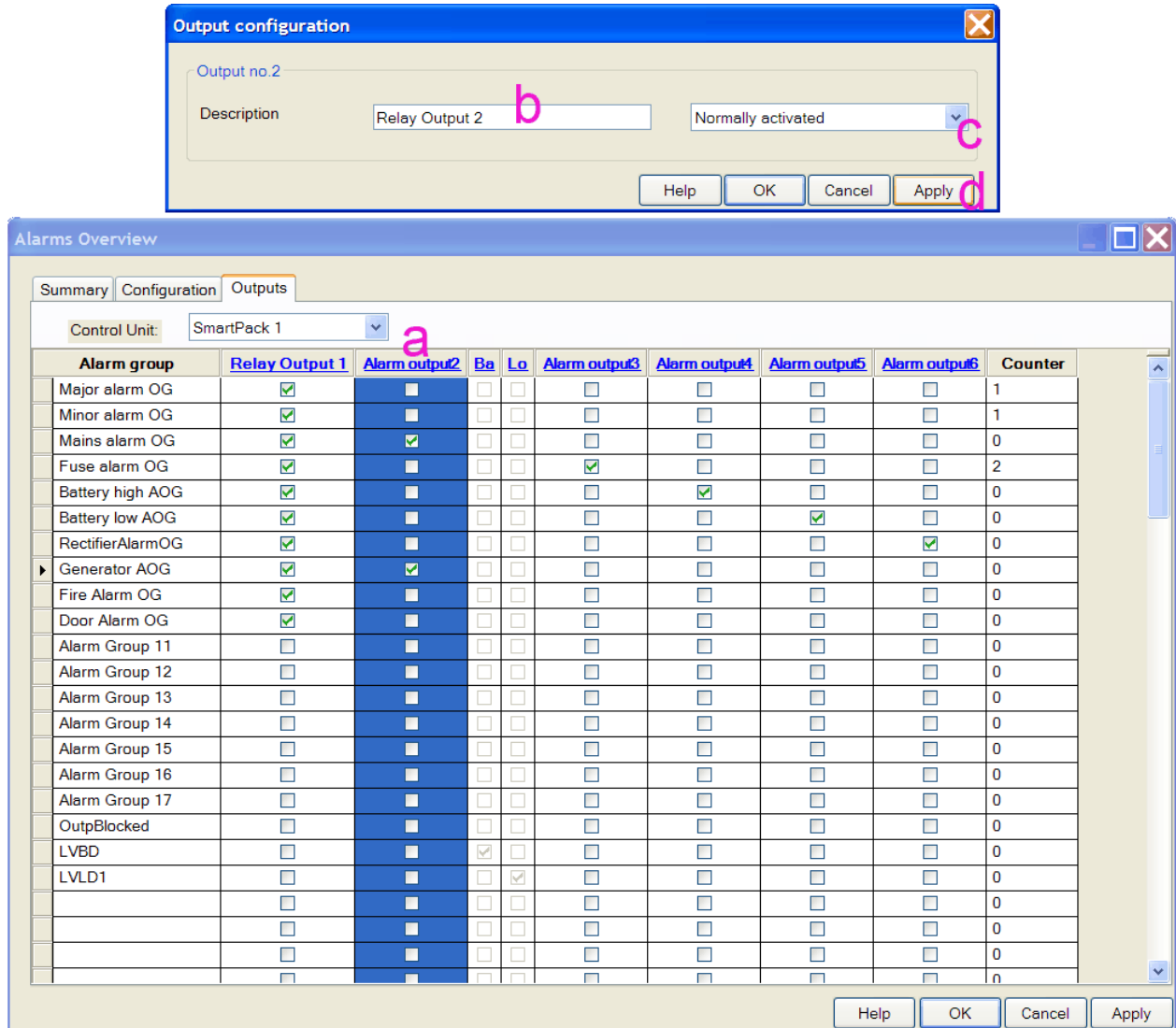
NOTICE: If the selected control unit is a *Smartnode*, the columns to the right represent the *Smartnode*'s outputs: telephone numbers, instead of relay outputs.

The assignment procedure is the same, but you check the phone numbers the modem connected to the *Smartnode* will dial, when the Alarm Output Group is in alarm state. Read also “[Control Unit Modem Callback Setup tab](#)” on page 155 .

<<< Back to dialog box “[Alarms Overview Outputs tab](#)” on page 59.

Editing the Alarm Output's Name and Operation

To change the alarm **outputs' name (a)**, and configure whether the output **relays and latching contactors are activated or not**, when the output is in normal state, do following:



- Click on the column name **(a)** for the actual alarm output that you want to configure.
PowerSuite displays the Output Configuration dialog box, so that you can edit the alarm output
- To edit the Output's Description
Click on the alarm output's **Description field (b)**, to insert the cursor in the name, and **edit the description text**
- To edit the Output's activation pattern
Click on the **drop-down arrow (c)**, and select:
-- <Normally Activated>, if the relay coil is energized when the output is in normal operation (default)
-- <Normally Deactivated>, if the relay coil is de-energized when the

output is in normal operation

-- *<Latched Contactor>*, if the output is a latching contactor

- And
In the Output Configuration dialog box,
click on the **Apply** button to activate the changes, then on the **OK** button.
In the Alarms Overview dialog box,
click on the **Apply** button to activate the changes, then on the **OK** button.

NOTICE: You must always configure a latching contactor as *<Latched Contactor>*! Do NOT configure it as *<Normally Activated>* or *<Normally Deactivated>*, as it may be physically damaged.

NOTICE: If the selected control unit is a *Smartnode*, the Output Configuration dialog box will only enable you to edit the telephone number's description (no activation pattern).

For information about how to edit an alphanumeric field, and use the drop-down list, refer to the Glossary section.

<<< [Back to dialog box “Alarms Overview Outputs tab”](#) on page 59.

Power Explorer Pane dialog boxes

This topic describes the *PowerSuite* dialogue boxes accessible from the Power Explorer pane. Refer to the “[Program Window](#)” on page 14.

The Power Explorer pane presents a hierarchical tree structure of the main components in the power supply system (Windows Explorer style).

From the Power System top-level group, there are several main sub-groups (known as 'branches' or 'nodes').

- Power System (top level)
 - Mains
 - Generator (if applicable)
 - Rectifiers
 - Solar (if applicable)
 - Load
 - Battery
 - Control System

For information about the pane's colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

Power System

Following dialog boxes are used to interact with DC power supply system, and configure it with parameters that apply to the system in general.

Power System dialog box

This dialog box is displayed by double-clicking on the **Power System icon** in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

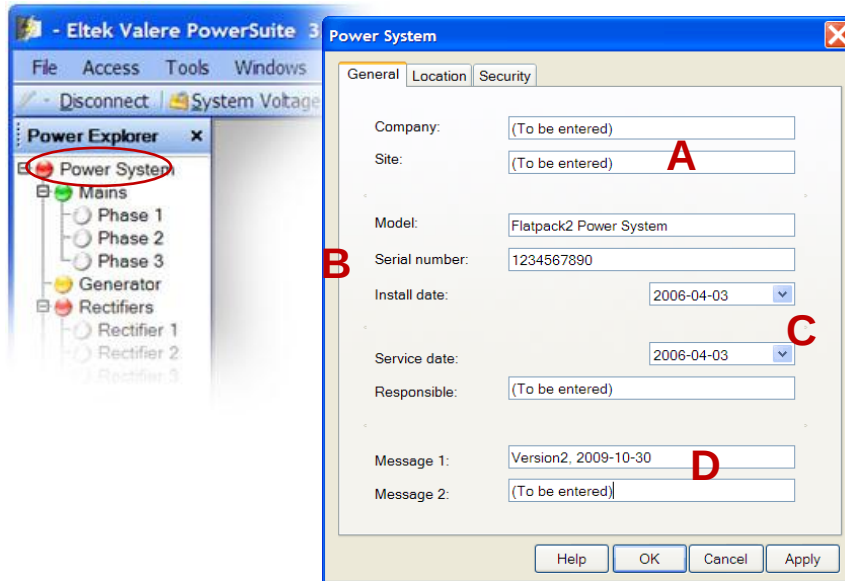
To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

General tab

Click on the “**General**” tab, to show its data, if necessary.

This dialog box opens automatically when you connect to a controller.

Here you can configure and view details related to the site and the power system installation.



You can enter information that describe the power system, the site's name (A), serial number (B), installation and service dates (C), software version (D), etc.

Entering a field value is optional, however is highly recommended for future identification, maintenance and traceability activities.

You must log in (with a password) before you can make field changes.

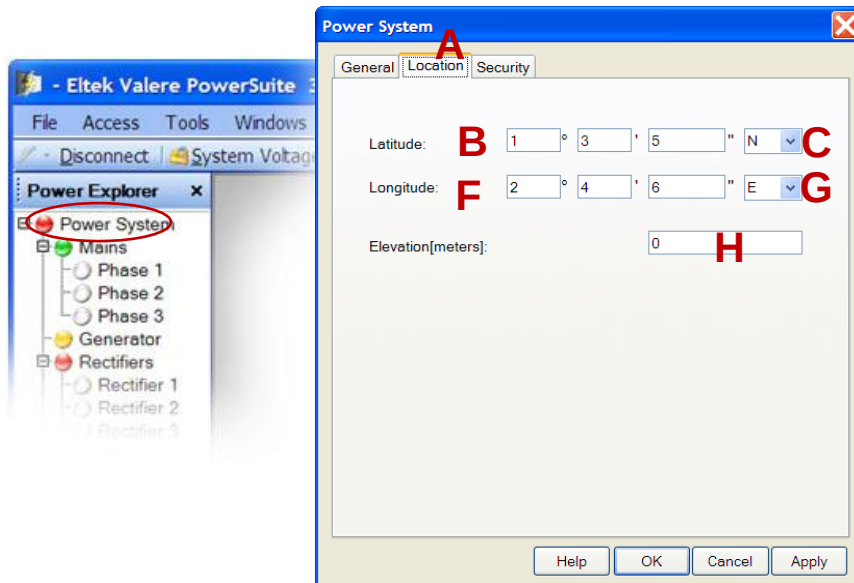
For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Location tab

Click on the “**Location**” tab (A), to show its data.

Here you can register the **exact global position** or location where the **DC power system** is installed.

The global position data is stored in the controller, and used by the *MultiSite Monitoring PC Application* software to dynamically display the position of power system installations in maps.



- Enter the power system's **Latitude** (B) in Degrees (°), minutes (') and seconds ('). and select North (N) or South (S) of the equator (C)
- Enter the power system's **Longitude** (F) in Degrees (°), minutes (') and seconds ('). and select East (E) or West (W) of the Prime Meridian (G)
- Enter the power system's **Elevation** (H) in meters; how high on the Earth's surface the system is from sea level

You must log in (with a password) before you can make field changes.

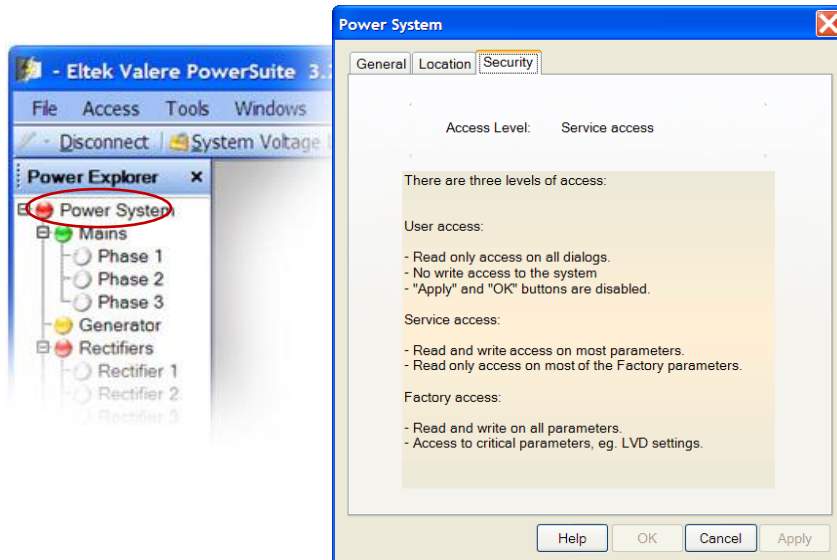
For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

You find more detailed description in topic Location – Map Coordinates, in the [Functionality Description section](#).

Security tab

Click on the “**Security**” tab, to show its data.

In this tab you can view the available security levels, and the access rights each level provides.



Read also topic [Access Levels](#) (page 19), in the [Functionality Description](#) section.

Mains

Following dialog boxes are used to interact with DC power supply system, and configure it with AC Mains related parameters.

Mains dialog box

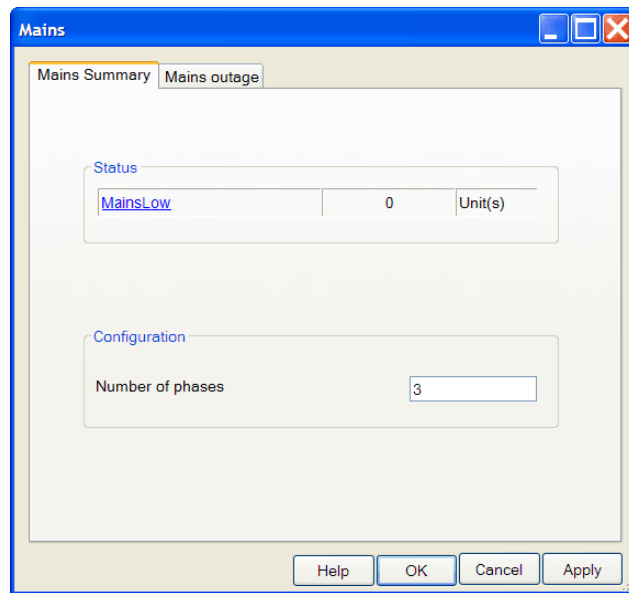
This dialog box is displayed by double-clicking on the **Mains icon** in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

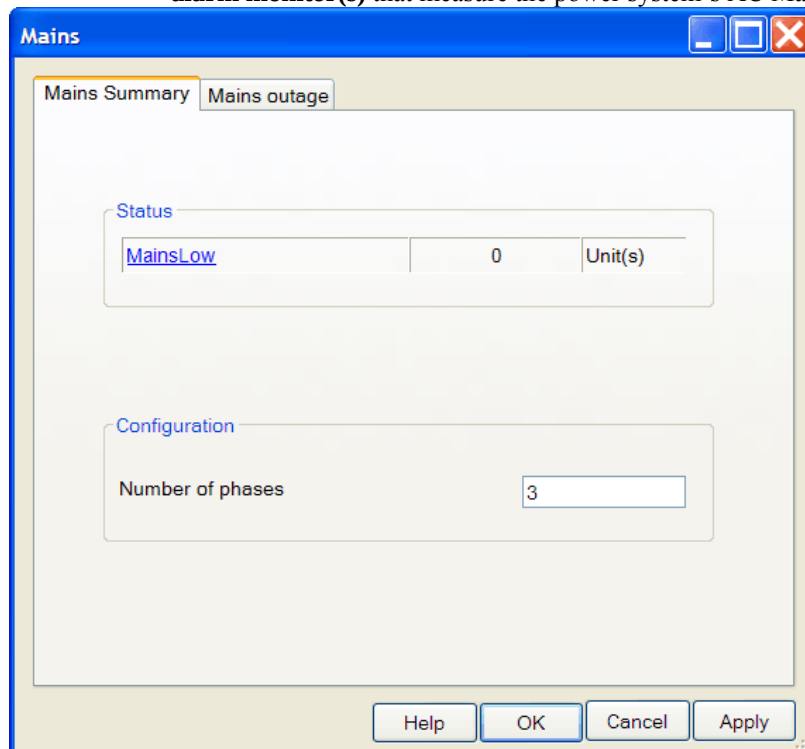
Information about the functionality for the power system's AC Mains supply is gathered in this dialogue box.

Click on the actual tab to display its data.



Mains Summary tab

The “**Mains Summary**” tab in this dialogue box displays the **status of the alarm monitor(s)** that measure the power system’s AC Mains supply.



- The “**MainsLow**” alarm monitor displays **number** of mains voltage **alarm monitors** (MainsVolt X) that are **in alarm**.
To see the monitoring limits configured for the “Minor Low” and “Major Low” events, refer to the “MainsVolt X” alarm monitor in the “[Mains Phase nn dialog box](#)” on page 70
- Click on the “**Number of Phases**” text box and type the number of AC phases used in the DC power system’s AC Mains feed, e.g. “3”

You can **click on the displayed alarm monitor links** to view or edit the monitors' parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

Find more generic information in topic the "[Alarm Monitor dialog boxes](#)" on page 163.

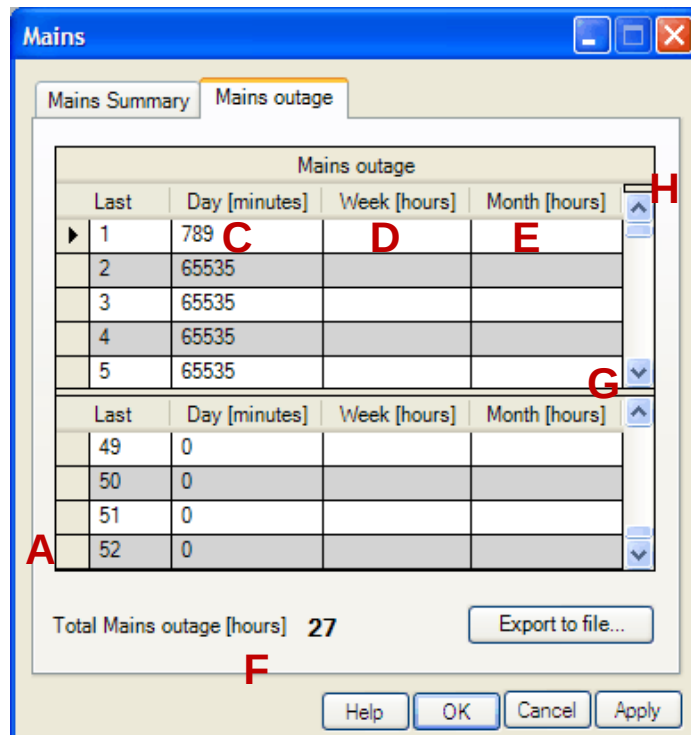
Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Mains Outage tab

This dialog box is displayed by double-clicking on the **Mains icon** in the **Power Explorer pane**, and then clicking on the "**Mains Outage**" tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of dialog box with the Mains Outage Log.

- The "Mains Outage" tab displays the "Mains Outage Log", which is a *measurement log* that records **how long time the power system's AC Mains feed has been OFF**. The log displays the duration of the mains outages in minutes during **the last day (C)**, in hours during the **last week (D)** and in hours during the **last month (E)**.
- It also displays **how long time** the AC Mains feed has been OFF since the first **system start-up (F)**.
- The system controller stores the **latest 52 sets of measurements** or calculations (A), which can be displayed by the Mains Outage Log.

By dragging the split box (I) down to the middle (H), you can browse the log in two different panes

Clicking on the “**Export to file**” button, enables to save the log in XML format to a computer.

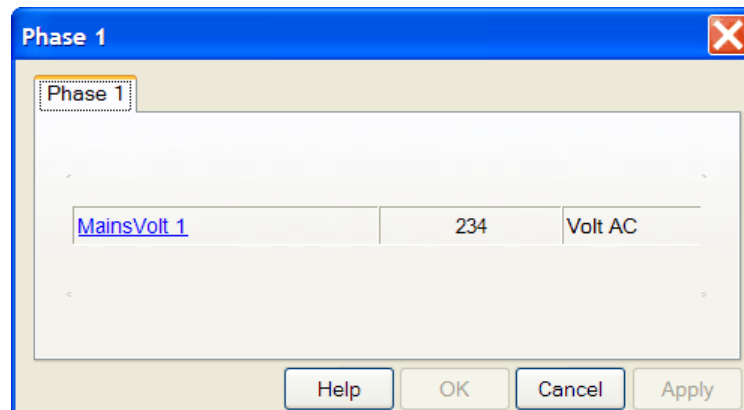
You find more graphical, detailed description in the “Mains Outage Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description](#) section.

Mains Phase nn dialog box

This dialog box is displayed by double-clicking any of the **Mains Phases icons** in the **Power Explorer pane**.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.



The “**Phase nn**” tab in this dialogue box displays the **status of the alarm monitor(s)** that measure the power system’s AC Mains on the actual phase.

- The “**MainsVolt nn**” alarm monitor displays the AC mains voltage on phase nn.

You can **click on the displayed alarm monitor links** to view or edit the monitors’ parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Mains Monitor nn dialog box

This dialog box is displayed by double-clicking on the **Mains Monitor nn icon** (MainsMon nn), in the **Power Explorer pane**, under the Mains group.

The icon will only be displayed if a Mains Monitor module is physically connected to the CAN bus.

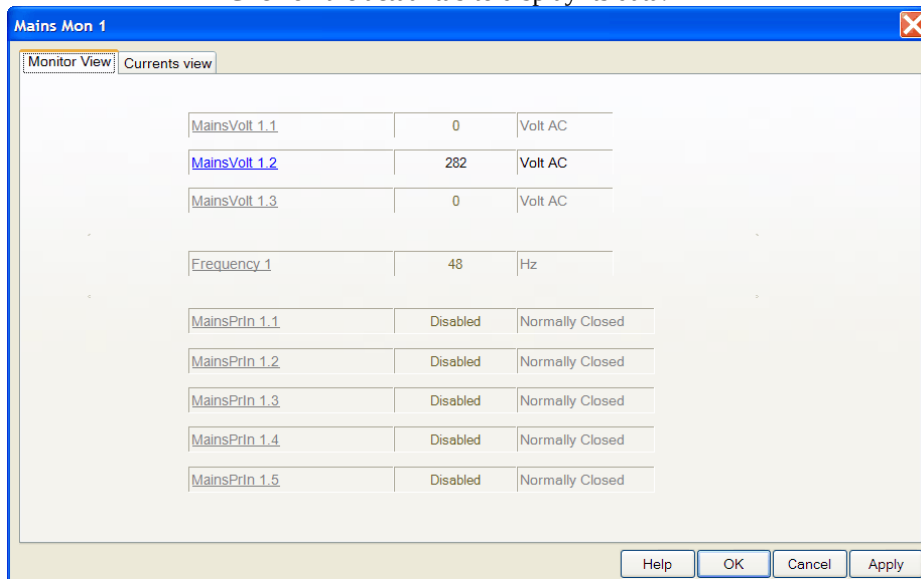
Read more about [The Mains Monitor Control Unit - Overview](#) (page 364), in the [Functionality Description](#) section.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

Information about the power system's AC Mains functionality implemented in connected Mains Monitor modules is gathered in this dialogue box.

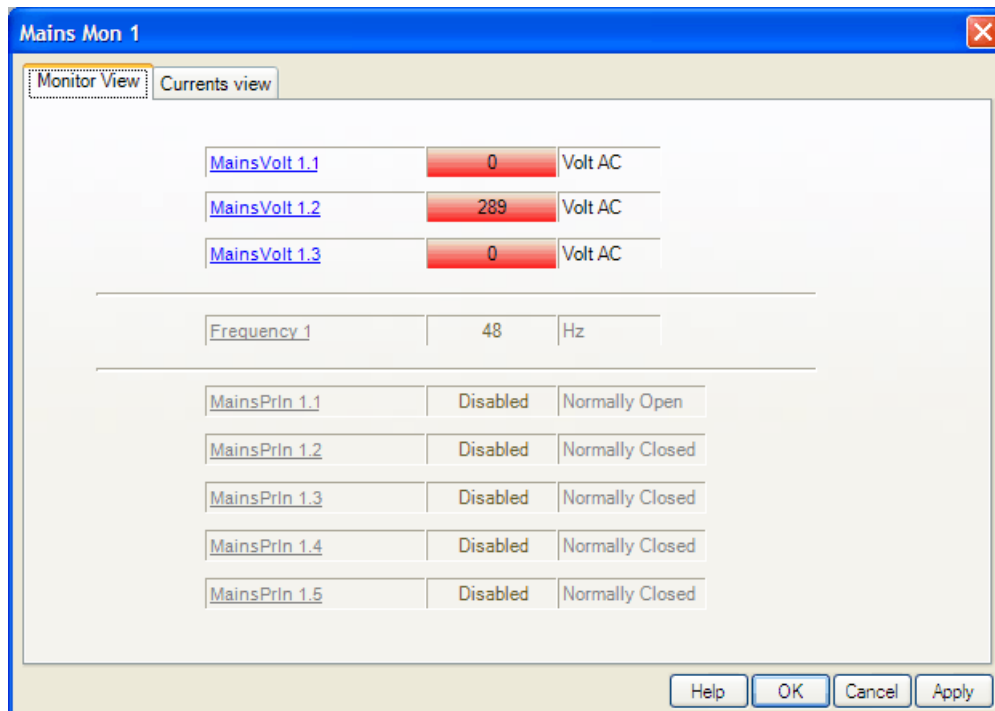
Click on the actual tab to display its data.



Monitor View tab

The "**Monitor View**" tab in this dialogue box displays the **status of the alarm monitors** -- specific to connected Mains Monitor modules -- that measure the power system's AC Mains supply.

The dialog box may display more tabs than shown in the example.



This dialogue box displays the status of the system's Mains Monitor measurements carried out by several alarm monitors:

- The **AC phase voltage** -- phase-to-phase or phase-to-neutral -- measured by alarm monitors "**MainsVolt X.X**" is used to generate mains alarms when the voltage is out of the configured limits
- The mains feed **AC frequency** (Hz) measured by alarm monitors "**Frequency X**" is used to generate mains alarms when the frequency is out of the configured limits
- The alarm monitors "**MainsPrIn X.X**" are used as standard programmable, digital inputs for monitoring SPD or any other suitable external devices.

Read how to configure standard programmable inputs in topic "[Control Unit Input Handler tab](#)" on page 147

You can **click on the displayed alarm monitor links** to view or edit the monitors' parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

Find more generic information in topic the "[Alarm Monitor dialog boxes](#)" on page 163.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

You may also find useful the topic [The Mains Monitor Control Unit - Overview](#) (page 364), in the [Functionality Description section](#).

<<< [Back to the "Mains Monitor nn dialog box"](#) on page 70

Currents View tab

The screenshot shows the 'Mains Mon 1' window with the 'Currents view' tab selected. It displays a table of current measurements and their respective energy logs. The 'Energy log' dialog box is open, showing a detailed view of the energy supplied for each current sense input.

Mains Mon 1 - Currents view

Monitor	Value	Unit	Max	Energy	Energy Value
MainsCurr 1.1	0	Amp	200 A max	Energy	1
MainsCurr 1.2	30	Amp	200 A max	Energy	4275743740
MainsCurr 1.3	0	Amp	200 A max	Energy	721420288
TotMainsCurr 1	30	Amp		Energy	4788260

Mains Mon 1.2 Energy log

Energy Supplied			
Energy Last	Hour [wh]	Day [kwh]	Week [kwh]
1	3428	2	479
2	3426	81	494
3	3377	3	19639
4	3453	43	42275
5	3479	2	0
6	3408	1	29
7	3446	31	0
8	3398	2	0
9	3348	18	297
10	3322	2	0
11	3351	95	48
12	3409	97	19639
48	3367	0	0
49	3347	12364	30
50	3346	46928	0
51	3326	52736	0
52	3161	0	299
MinEnergy	58880	0	47034
MaxEnergy	16135	19639	12364

Energy Supplied [wh] **4275743740** Export to file... Close

The “**Currents View**” tab in this dialogue box displays the **status of the alarm monitors** that measure the power system’s **AC currents** and respective “**Energy Logs**”:

- The **total AC current measured** (A) by the mains monitor’s current sense inputs.
The “**TotMainsCurr nn**” alarm monitor **does not really measure** the AC current, but generates alarms based on the addition of the current measurements performed by the individual “**MainsCurr X.X**” alarm monitors
- The **AC current measured by each current sense input** (B) in the actual mains monitor.
E.g.: alarm monitor “**MainsCurr 1.3**” monitors current sense input #3 implemented in Mains Monitor #1.
Notice that to achieve **accurate measurements**, the “**MainsCurr 1.3**” **alarm monitors** must be **correctly calibrated and scaled**.
You can click on the “**TotMainsCurr nn**” and the “**MainsCurr X.X**” alarm monitor links to view or edit and calibrate the monitors’ parameters.

The **max. value of the current shunt** used by each current sense input is also displayed (G)

- Click on the “**Energy**” **buttons** (C) to open the “**Energy Logs**” dialog boxes for the individual current sense inputs.
Each of the “**MainsCurr X.X**” Energy Logs displays the **energy provided via the actual AC phase** to the power system, (Wh).

The “TotMainsCurr nn” Energy Log displays the **energy provided via all the 3 AC phases** to the power system, (Wh).

- The “**Energy Logs**” dialog boxes (*measurement logs*) show the **energy** provided via actual AC phase to the power system during the **last hour**, during the **last day** and during the **last week**.
It also displays the **total (E), minimum and maximum energy** provided via the actual AC phase to the power system since the first system start-up.
The system controller stores the latest **52 sets of measurements** or calculations, which can be displayed by the Energy Log.
Clicking on the “**Export to file**” button, enables to save the Energy Log in XML format to a computer.

You find more graphical, detailed description in the “Energy Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description section](#).

You can **click on the displayed alarm monitor links** to view or edit the monitors’ parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

[<<< Back to the “Mains Monitor nn dialog box” on page 70](#)

AC Generator

Following dialog boxes are used to interact with DC power supply system, and configure it with AC Generator related parameters.

Generator dialog box

This dialog box is displayed by double-clicking on the **Generator icon** in the **Power Explorer pane**.

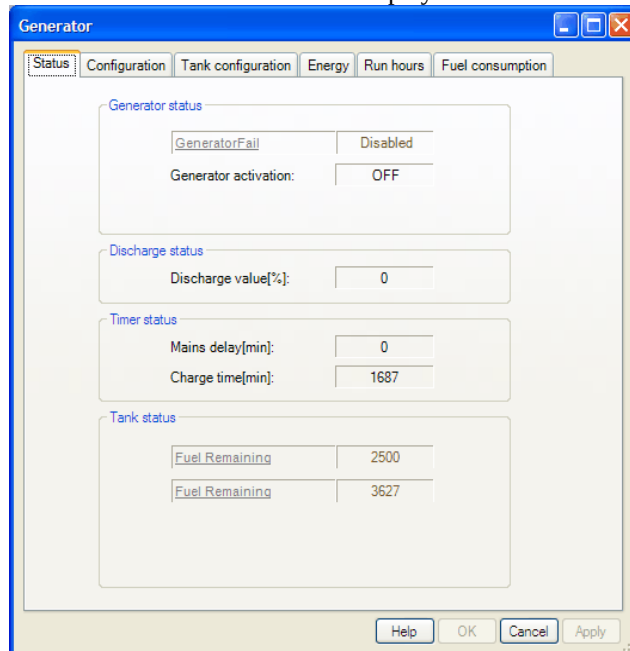
For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

Information about the power system's AC Generator functionality is gathered in this dialogue box.

Read more about [AC Generator as AC Mains](#) (page 258), in the [Functionality Description](#) section.

Click on the actual tab to display its data.

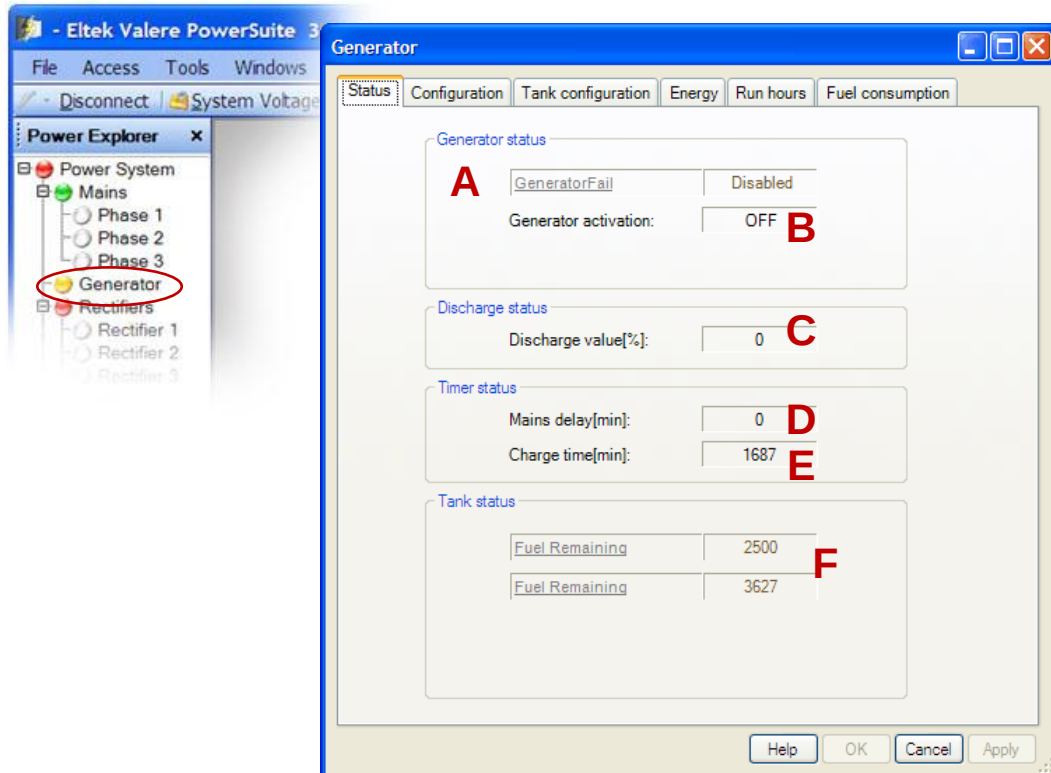


Generator Status tab

The "**Status**" tab in this dialogue box displays the **status of the alarm monitors** that control the power system's AC generator functionality, such as generator monitoring, battery discharge level, configured delays, fuel remaining in the gen-set's tanks, whether the gen-set is running or not, etc.

Read more in topic [Configuration Criteria](#) (page 260), in the [Functionality Description](#) section. The topic describes an example of a hybrid system.

If necessary, click on the "**Status**" tab, to show its data.



- The enabled alarm monitor “**GeneratorFail**” (A) monitors the system’s AC mains input.
The monitor outputs a **generator alarm**, if the controller has started the generator (“Generator activation” is ON) and the mains input is OFF.
NOTICE:
Controllers with older firmware versions had to use a dedicated digital input to activate this generator alarm.

- The **activation status** of the **generator** (B).
Status “ON” means that system controller has activated the gen-set via the configured alarm output group, and it should be running, as the power system’s AC mains input is ON.
- The **battery discharge level** (% DOD) during the last measured battery cycle (C).
The controller uses the configured DOD level, among other conditions, to start the gen-set.

Read more about the [Battery Discharge Cycles Log](#) (page 240), in the [Functionality Description section](#)

- The **configured Mains delay** time (D).
The delay will prevent starting the generator during short mains outages
- The “**Charge Time (min)**” field (E) indicates the period of time the **generator has been running**, charging the batteries, during the last measured battery cycle.
- The alarm monitors “**FuelRemaining**” (F) monitor the volume of fuel remaining in the gen-sets’ fuel tanks. They indicate the number of liters, gallons or volume units remaining in each tank, based on the Tank Configuration data.
Read more in the “[Generator Tank Configuration tab](#)” on page 78.

The monitors output a **fuel alarm**, if the level of fuel in the tanks is under a configured limit.

Read more about [AC Generator as AC Mains](#) (page 258), in the [Functionality Description](#) section.

Generator Configuration tab

This dialog box is displayed by double-clicking on the **Generator icon** in the **Power Explorer pane**, and then clicking on the “**Configuration**” tab.

The dialog box may display more tabs than shown in the example.

The screenshot shows the 'Generator' dialog box with the 'Configuration' tab selected. The dialog has several tabs: Status, Configuration, Tank configuration, Energy, Run hours, and Fuel consumption. The 'Configuration' tab contains the following sections and parameters:

- Long charge time[h]:** 16 (labeled G)
- Stop delay[min]:** 10 (labeled D)
- Mains delay[min]:** 5
- Enable boost during charge:** ☒ (labeled E)
- Event:** Generator (labeled F)
- Alarm group:** Gen-set Start (labeled A), None selected (labeled G)
- Capacity setup:** Capacity controlled generator start/stop (labeled B)
 - Enable:** ☒
 - Start generator on:** 20 (discharge limit[%])
 - Stop generator on:** 85 (charge limit[%])
- Current limit controlled generator stop:** (labeled C)
 - Enable:** ☒
 - Generator stop current limit[A]:** 1

At the bottom, there are buttons for Help, OK, Cancel, and Apply.

For a complete description of the parameters in this dialog box and other required gen-set configuration parameters, read the topics: [AC Generator as AC Mains](#) (page 258) and [Configuration of Generator Functionality](#) (page 262) in the [Functionality Description](#) section.

- Select or change the parameters in the sections
 - (A)— Selection of **alarm output group** to start the gen-set
 - (B)— **Capacity controlled**, automatic gen-set **start & stop** section (% DOD)

- (C)—**Current limit controlled**, automatic **generator stop** section
- (D)— **AC Mains controlled**, automatic generator **start & stop** section
- (E)— Enable Boost charging check box
- (F)— **Daily Setup**, periodic generator **start & stop** tab
- (G)— **Monthly Setup**, periodic generator **start & stop** tab, and **Long Charge Time** duration
- (H)— **Voltage Setup**, automatic generator **start & stop** tab

and

- Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Generator Tank Configuration tab

This dialog box is displayed by double-clicking on the **Generator icon** in the **Power Explorer pane**, and then clicking on the “**Tank Configuration**” tab.

The dialog box may display more tabs than shown in the example.

Height[cm]	Volume
0	0
10	250
20	500
30	750
40	1000
50	1250
60	1500
70	1750
80	2000
90	2250
100	2500
110	2750
120	3000
130	3250
140	3500
150	3750
160	4000
170	4250
180	4500
190	4750

For a complete description of the parameters in this dialog box and other required gen-set configuration parameters, read the topic [Step 9- Configure the fuel tank](#) (page 273) in the [Functionality Description](#) section.

Also useful, in the same section, are the descriptions in topics: [AC Generator as AC Mains](#) (page 258) and [Configuration of Generator Functionality](#) (page 262)

- Select and enter the parameters in the sections
 - (A)— Enter the **number of fuel tanks** implemented in the gen-set (2 tanks maximum)
and click on the **Apply** button to register the change
 - (B)— Select **tank number** to configure
(when using 2 tanks, repeat the configuration for the other tank)
 - (C)— Enter a **description name for the tank**
(include the used units in the tank description name)
 - (D)— Enter the **total tank's volume**
(The volume data may be entered in liters, gallons or any other suitable volume unit)
 - (E)— Enter a suitable **strapping table increment** in cm
 - (F)— Enter a suitable **sensor offset** in cm
(compensates for the unmeasured length at the bottom of the sensor)
 - (G)— For each of the **strapping table** rows, enter the **corresponding volume**.
(The volume data may be entered in liters, gallons or any other suitable volume unit)
NOTICE:
The volume values displayed in the dialog box are just default entries in this example.
 - (H)— Click in the “**Change**” button,
and in the displayed “Input Configuration” section,
select the I/O Monitor3 CAN Node and its corresponding **digital input**,
used to monitor the Fuel Level Transducer,

and click on the **Apply** button, right under the “Select Input” field

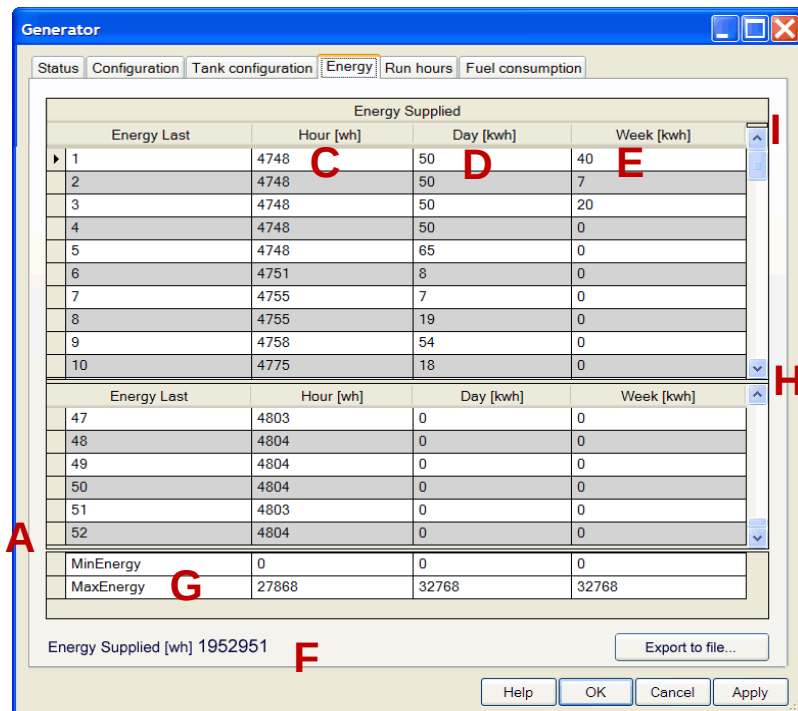
and
- Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Generator Energy tab

This dialog box is displayed by double-clicking on the **Generator icon** in the **Power Explorer pane**, and then clicking on the “**Energy**” tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of dialog box with the generator's Energy Log.

The "Energy" tab displays the generator's "Energy Log", which is a *measurement log* that records **the energy supplied by the gen-set to the power system**, (Wh).

The controller logs the **energy supplied** by the generator during the **last hour** (C), during the **last day** (D) and during the **last week** (E).

Also, the controller logs the **total** (F), **minimum and maximum** (G) **energy supplied** by the generator since the first system start-up.

The system controller stores the latest 52 calculations (A), which can be displayed by the Energy Log. By dragging the split box (I) down to the middle (H), you can browse the log in two different panes.

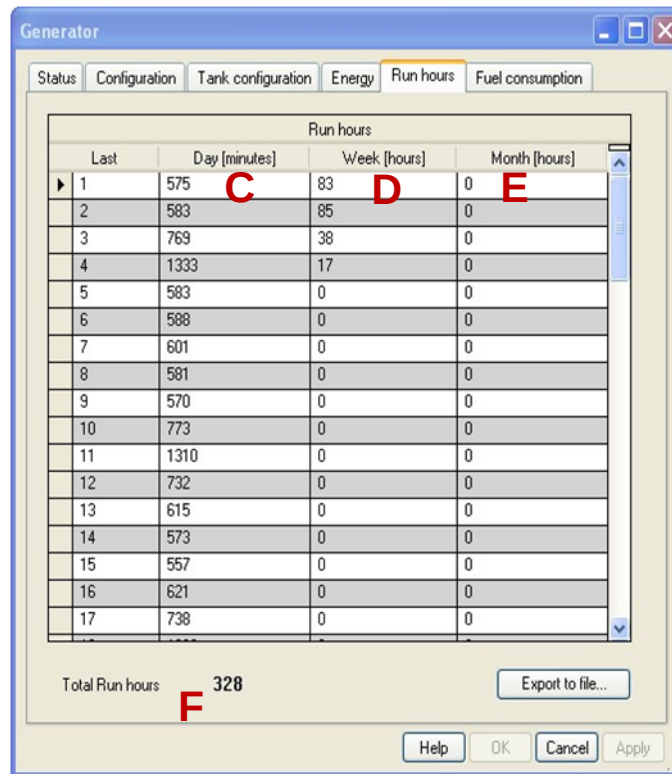
You find more graphical, detailed description in the "Energy Log" topic of [Measurement Logs](#) (page 232), in the [Functionality Description section](#).

Clicking on the "**Export to file**" button, enables to save the Energy Log in XML format to a computer.

Generator Run Hours tab

This dialog box is displayed by double-clicking on the **Generator icon** in the **Power Explorer pane**, and then clicking on the "**Run Hours**" tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of *PowerSuite* dialog box with the Generator Run Hours Log.

- The “Run Hours” tab displays the “Generator Run Hours Log”, which is a *measurement log* that records **how long time the gen-set has being ON**, or running. The log displays the generator running time during **the last day (C)**, in minutes; and during the **last week (D)** and the **last month (E)**, in hours.
- It also displays **how long time** the gen-set has being ON, or running since the first **system start-up (F)**.
- The system controller stores the **latest 52 sets of measurements** or calculations, which can be displayed by the Generator Run Hours Log.

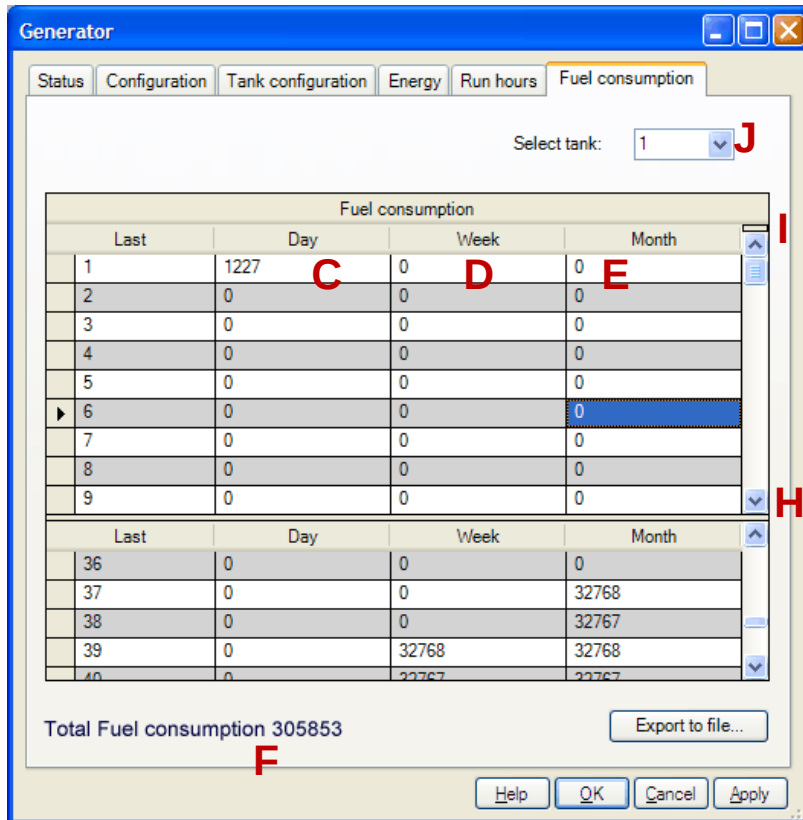
Clicking on the “**Export to file**” button, enables to save the log in XML format to a computer.

You find more graphical, detailed description in the “Generator Run Hours Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description section](#).

Generator Fuel Consumption tab

This dialog box is displayed by double-clicking on the **Generator icon** in the **Power Explorer pane**, and then clicking on the “**Fuel Consumption**” tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of *PowerSuite* dialog box with the Generator Fuel Consumption Log.

- The “Fuel Consumption” tab displays the “Generator Fuel Consumption Log”, which is a *measurement log* that records **how much fuel the gen-set has consumed** during **the last day** (C), during the **last week** (D) and during the **last month** (E).
- It also displays **how much fuel** the gen-set has consumed since the first **system start-up** (F)
- Select the **tank number** (J) to display the selected tank’s **fuel consumption log**
- The fuel consumption is displayed in liters, gallons or any other **suitable volume unit**.
Refer to topic “[Generator Tank Configuration tab](#)” on page 78
- The system controller stores the **latest 52 sets of measurements** or calculations, which can be displayed by the Generator Fuel Consumption Log.
By dragging the split box (I) down to the middle (H), you can browse the log in two different panes.

Clicking on the “**Export to file**” button, enables to save the log in XML format to a computer.

You find more graphical, detailed description in the “Generator Fuel Consumption Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description](#) section.

Rectifiers

Following dialog boxes are used to interact with DC power supply system, and configure it with rectifier related parameters.

Rectifier dialog box

This dialog box is displayed by double-clicking on the **Rectifiers icon** in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

Information about the functionality for the power system's rectifiers is gathered in this dialogue box.

Click on the actual tab to display its data.

The screenshot shows the 'Rectifiers' dialog box with the 'Summary' tab selected. The dialog box has a title bar with 'Rectifiers' and standard window controls. Below the title bar are four tabs: 'Summary', 'Configuration', 'Efficiency', and 'Energy'. The 'Summary' tab is active, displaying a table of parameters and their values. At the bottom, there is a section for 'Efficiency manager status' showing 'Disabled'. The bottom of the dialog box contains 'Help', 'OK', 'Cancel', and 'Apply' buttons.

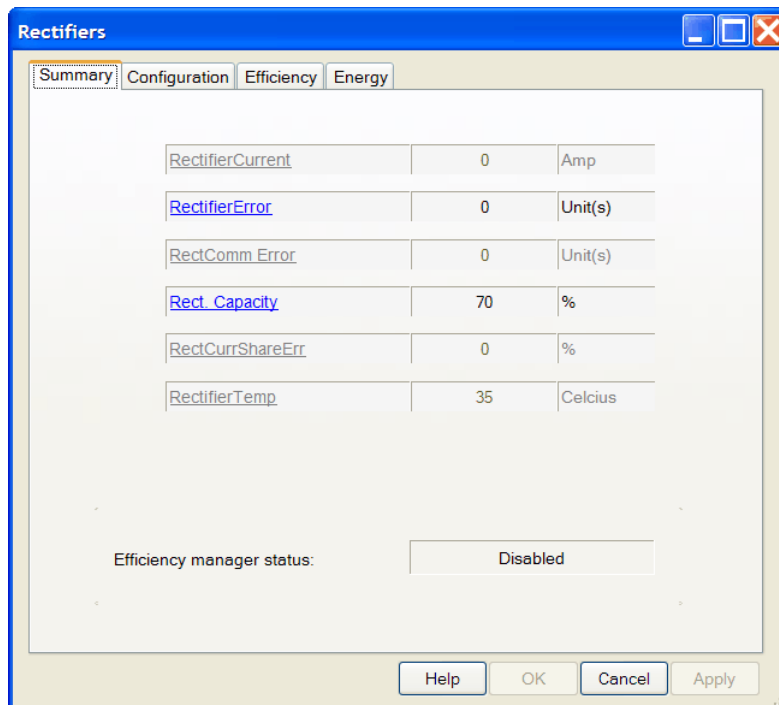
RectifierCurrent	0	Amp
RectifierError	0	Unit(s)
RectComm Error	0	Unit(s)
Rect_Capacity	70	%
RectCurrShareErr	0	%
RectifierTemp	35	Celcius

Efficiency manager status: Disabled

Summary tab

If necessary, click on the "**Summary**" tab, to show its data.

The "**Summary**" tab in this dialogue box displays the **status of the alarm monitors** that measure the power system's rectifiers, and the status of the Efficiency Management feature.



- The “**RectifierCurrent**” alarm monitor does not really measure the rectifier current. It raises alarms based on the **addition of all the rectifier currents**.

This alarm monitor is also displayed in the Power Summary pane; see “[Program Window](#)” on page 14.

- The “**RectifierError**” alarm monitor indicates the number of rectifiers that are reporting alarm conditions (are in error status)
- The “**RectComm_Error**” alarm monitor shows the number of rectifiers that are reporting a CAN bus communication error
- The “**Rect_Capacity**” alarm monitor displays the percentage of the total rectifier capacity consumed by the DC load.
E.g.: 70% capacity indicates that the load is consuming 70A, when the power system is engineered to supply a maximum current of 100A
- The “**RectCurrShareErr**” alarm monitor observes the rectifiers’ current sharing, and indicates the worst percentage of deviation from the *mean rectifier output current*.

Read also the [Rectifiers Current Sharing](#) (page 285) topic in the [Functionality Description](#) section.

- The “**RectifierTemp**” alarm monitor indicates the highest registered rectifier temperature
- The status of the “**Efficiency Manager**” feature.
Status “Disabled” means that the feature is not in use.

Read also the topic “[Efficiency Manager tab](#)” on page 89

Read more about [Efficiency Management](#) (page 280), in the [Functionality Description](#) section.

You can **click on the displayed alarm monitor links** to view or edit the monitors' parameters.

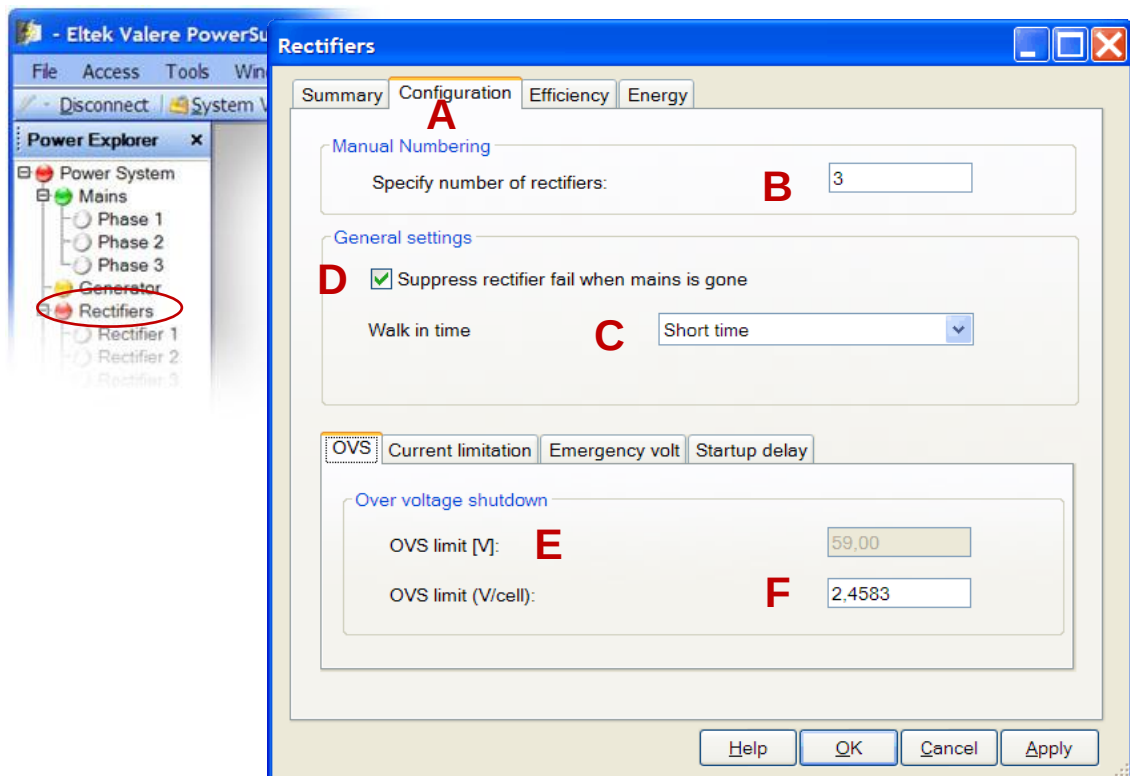
Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

Configuration tab

This dialog box is displayed by double-clicking on the **Rectifiers icon** in the **Power Explorer pane**, and then clicking on the “**Configuration**” tab (A).

The dialog box may display more tabs than shown in the example.



- Select or change the parameters in
 - **Manual Numbering** section (B)
 - **General Settings** section (D, C)
 - **OVS** sub-tab
 - **Current Limitation** sub-tab
 - **Emergency Voltage** sub-tab
 - **Start-up Delay** sub-tab

and

- Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Manual Numbering

- Click on the “**Specify number of rectifiers**” text box (B) and type the number of rectifiers connected to the DC power system, e.g. “3”

General Settings

- Click on the “**Walk in time**” drop-down arrow (C) and select how long time it will take to reach the default output voltage, by selecting “**Short Walk-in Time**” (5s) which is default or “**Long Walk-in Time**” (60s)

Read more about [Rectifier Walk-in Time](#) (page 282), in the [Functionality Description section](#)

- Click on the “**Suppress rectifier fail when mains is gone**” box (checked), if you **want to avoid** the system’s **Rectifier Alarm** during mains outages

OVS sub tab

- Click on the “**OVS limit (V/cell)**” text box (F) and type the rectifier’s OVS Trip Voltage (Over Voltage Shutdown), **expressed as a battery cell voltage**; e.g. “2.4583”
- Click on the **Apply** button to activate the changes

NOTICE:

The actual OVS Trip Voltage value in the “OVS limit (V)” text box (E), is updated when you click on the Apply button

The Rectifier OVS Trip Voltage is calculated as the **product of the battery cell voltage and the number of battery cells** in the power system. E.g. enter “2.4583” battery cell voltage to configure a OVS Trip Voltage of 59.00V (59V divided by 24 battery cells in a 48V system equals 2.4583).

Read more about [Battery Banks, Strings and Blocks](#) (page 294), in the [Functionality Description section](#).

Read also the topic [Rectifier OVS Trip Voltage](#) (page 283), in the [Functionality Description section](#).

Current Limitation sub tab

The screenshot shows the 'Rectifiers' dialog box with the 'Configuration' tab selected. The 'Manual Numbering' section has 'Specify number of rectifiers:' set to 3. The 'General settings' section has 'Suppress rectifier fail when mains is gone' checked and 'Walk in time' set to 'Short time'. The 'Current limitation' sub-tab is active, showing 'Enable' checked (labeled H) and 'Current limit value [A]:' set to 999 (labeled G). The 'OVS', 'Emergency volt', and 'Startup delay' sub-tabs are also visible. At the bottom are 'Help', 'OK', 'Cancel', and 'Apply' buttons.

- Click on the “**Current Limit value [A]**” text box (G) and type the maximum **total current output from the rectifiers**, e.g. “999” amperes
- Click on the “**Enable**” box (H) (checked), to enable the rectifiers’ Current Limitation function
- Click on the **Apply** button to activate the changes

This function is used **limit the total current output** (load current and battery charging current) **from the rectifiers**.

Read also the topic [Rectifiers Current Limitation](#) (page 286), in the [Functionality Description](#) section.

Emergency Volt sub tab

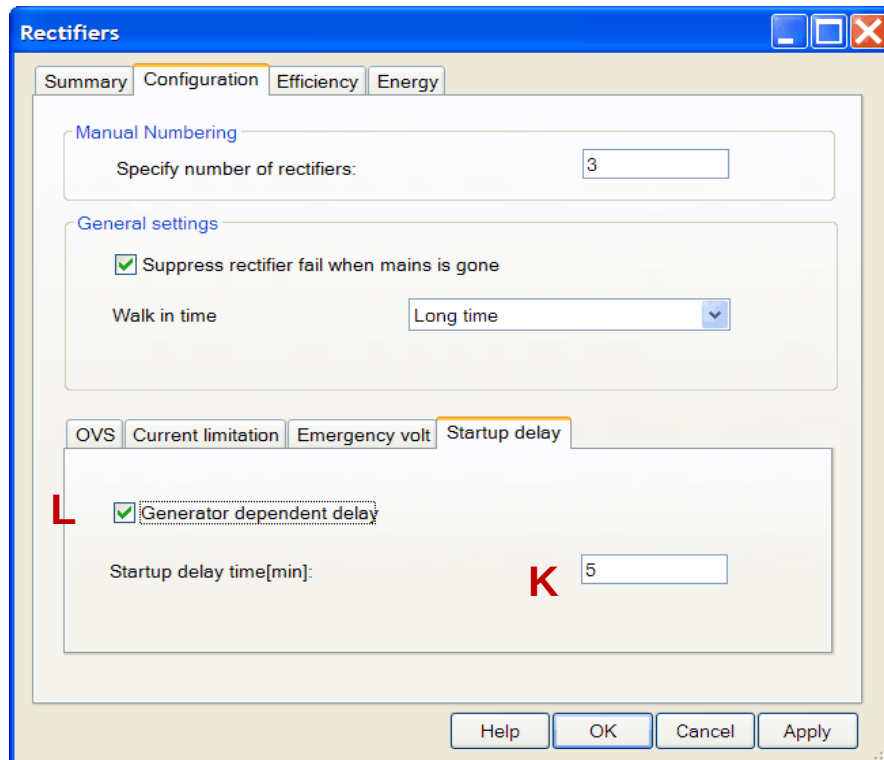
The screenshot shows the 'Rectifiers' configuration window with the 'Emergency volt' sub tab selected. The window has a blue title bar and standard Windows window controls. Inside, there are four tabs: 'Summary', 'Configuration', 'Efficiency', and 'Energy'. The 'Configuration' tab is active and contains two sections: 'Manual Numbering' and 'General settings'. The 'Manual Numbering' section has a text box labeled 'Specify number of rectifiers:' with the value '3'. The 'General settings' section has a checked checkbox 'Suppress rectifier fail when mains is gone' and a dropdown menu 'Walk in time' set to 'Short time'. Below these sections are four sub-tabs: 'OVS', 'Current limitation', 'Emergency volt', and 'Startup delay'. The 'Emergency volt' sub-tab is active and shows a text box labeled 'Emergency voltage[V]:' with a red 'J' icon and the value '53,52'. At the bottom of the window are four buttons: 'Help', 'OK', 'Cancel', and 'Apply'.

- Click on the “**Emergency Voltage [V]**” text box (J) and type the required emergency **output voltage from the rectifiers**, e.g. “53.52” volts
- Click on the **Apply** button to activate the changes

The system controller uses the Rectifier Emergency Voltage for security or site specific reasons.

Read also the topic [Rectifier Emergency Voltage](#) (page 284), in the [Functionality Description](#) section.

Start-up Delay sub tab



- Click on the “**Start-up delay time [min]**” text box (K) and type the number of minutes to delay the start-up of the rectifiers after an AC mains outage, e.g. “5” minutes
- Click on the “**Generator dependent delay**” box (L) (checked), to “connect” the delay to the controller’s Generator event.
- Click on the **Apply** button to activate the changes

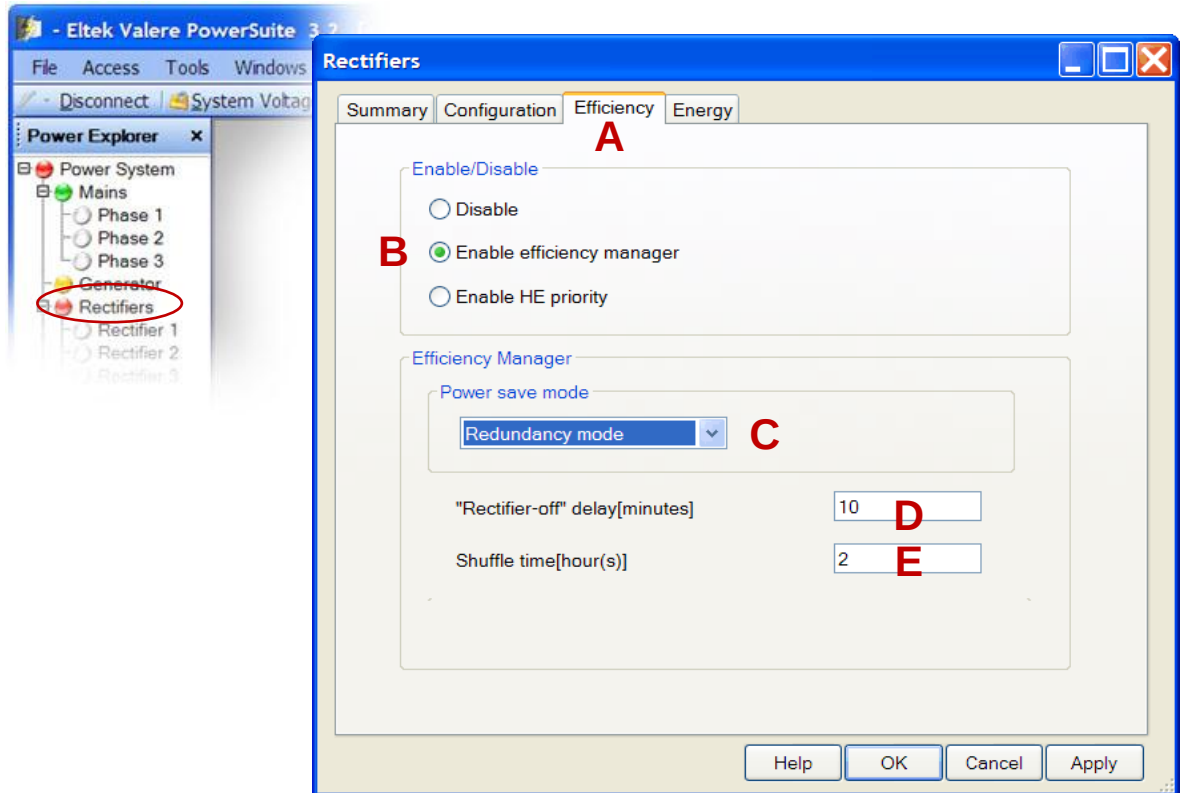
This function is used to reduce battery damage, caused by very large in-rush currents at AC connection and reconnections.

Read also the topic [Rectifiers Start-up Delay](#) (page 286), in the [Functionality Description](#) section.

Efficiency Manager tab

This dialog box is displayed by double-clicking on the **Rectifiers icon** in the **Power Explorer pane**, and then clicking on the “**Efficiency**” tab (A).

The dialog box may display more tabs than shown in the example.



NOTICE:

The “Efficiency Manager” section is **only displayed** when the “Enable efficiency manager” box is checked.
Also, when the “Enable HE priority” box is checked, there is no need for configuring the parameters in the “Efficiency Manager” section.

- Click on the “**Enable HE Priority**” box (checked), if you want to **enable the Efficiency Management**, but **only use** the function with **Flatpack2 HE rectifiers**.

The Efficiency Management parameters need then no further configuration.

Read more about [Efficiency Management](#) (page 280), in the [Functionality Description](#) section

AND

- Click on the **Apply** button to activate the changes, then on the **OK** button

OR

- Click on the “**Enable Efficiency Management**” box (checked), if you want to **enable the Efficiency Management**, and use the function with **all installed Flatpack2 rectifiers**

(the “Efficiency Manager” section will then display)

- Click on the “**Power save mode**” drop-down arrow (C) and select and select “**Redundancy mode**” or “**No Redundancy mode**”
- Click on the “**Rectifier-off delay [minutes]**” text box (D) and type interval period of time in minutes before turning off the running rectifier, e.g. “10” minutes
- Click on the “**Shuffle time [hours]**” text box (E) and type interval period of time in hours to rotate the running rectifiers, e.g. “2” hours

AND

- Click on the **Apply** button to activate the changes, then on the **OK** button

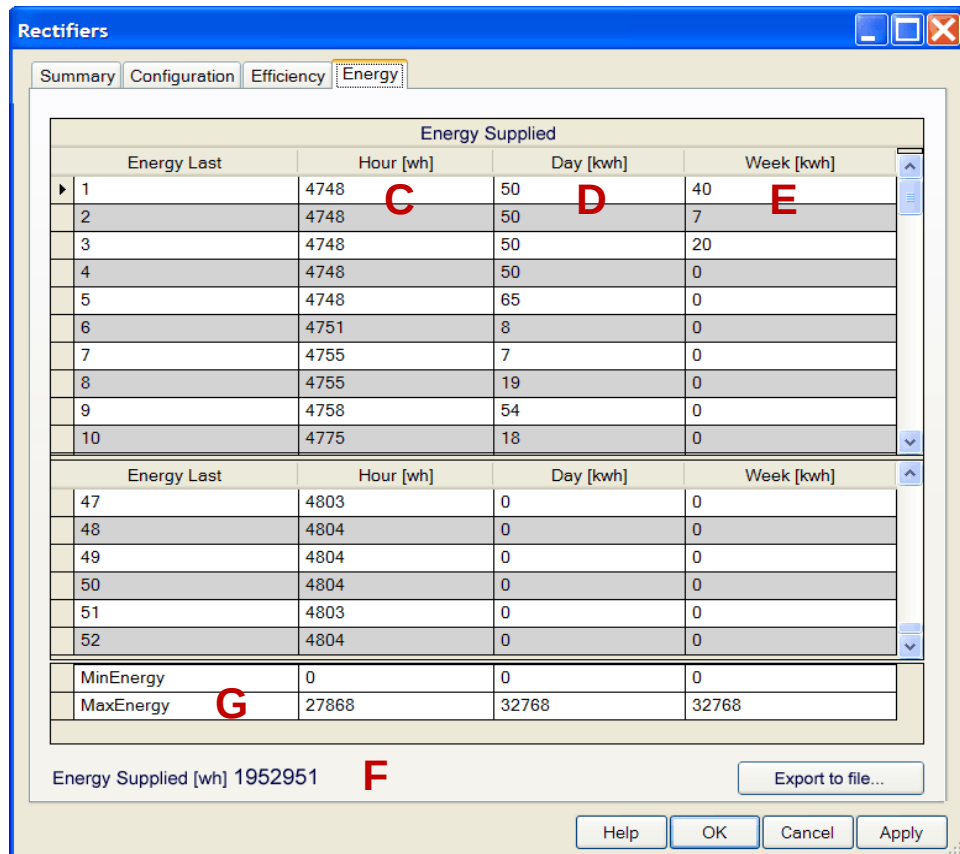
Read more about [Efficiency Management](#) (page 280), in the [Functionality Description](#) section

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Energy tab - Rectifiers

This dialog box is displayed by double-clicking on the **Rectifiers icon** in the **Power Explorer pane**, and then clicking on the “**Energy**” tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of dialog box with the rectifiers' Energy Log.

The "Energy" tab displays the rectifiers' "Energy Log", which is a *measurement log* that records **the energy delivered from the system's rectifiers**, (Wh).

The controller logs the **energy delivered** by the rectifiers during the **last hour (C)**, during the **last day (D)** and during the **last week (E)**.

Also, the controller logs the **total (F)**, **minimum and maximum (G)** energy **supplied** by the rectifiers since the first system start-up.

The system controller stores the latest 52 calculations, which can be displayed by the Energy Log.

Clicking on the "**Export to file**" button, enables to save the Energy Log in XML format to a computer.

You find more graphical, detailed description in the "Energy Log" topic of [Measurement Logs](#) (page 232), in the [Functionality Description](#) section.

Rectifier Overview dialog box

This dialog box is displayed by double-clicking any of the **Rectifier icons** in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

You can export the rectifiers' parameters by saving them to your computer's disc in an XLM file. The file can then be opened in MS Excel.

Rectifier Status tab

If necessary, click on the “**Rectifier Status**” tab, to show its data.

Rectifier Details tab

If necessary, click on the “**Rectifier Details**” tab, to show its data.

Detailed Rectifier Status tab

If necessary, click on the “**Detailed Rectifier Status**” tab, to show its data.

Reallocate Rectifiers tab

If necessary, click on the “**Reallocate Rectifiers**” tab, to show its data.

Solar

Solar dialog box

Load

Following dialog boxes are used to interact with DC power supply system, and configure it with parameters related to the system's DC load.

Load dialog box

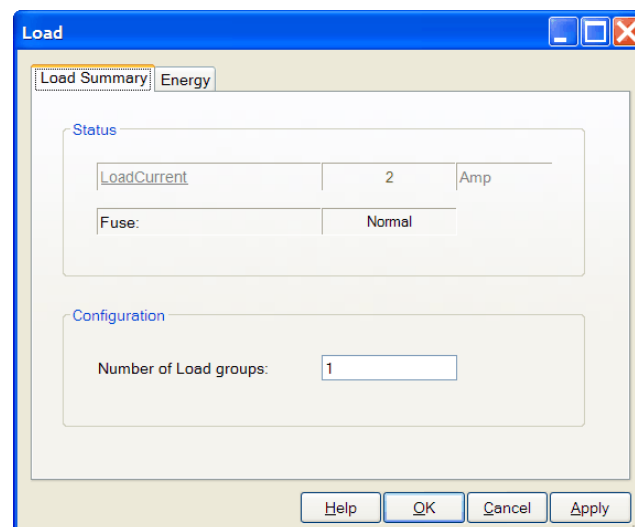
This dialog box is displayed by double-clicking on the **Load icon** in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

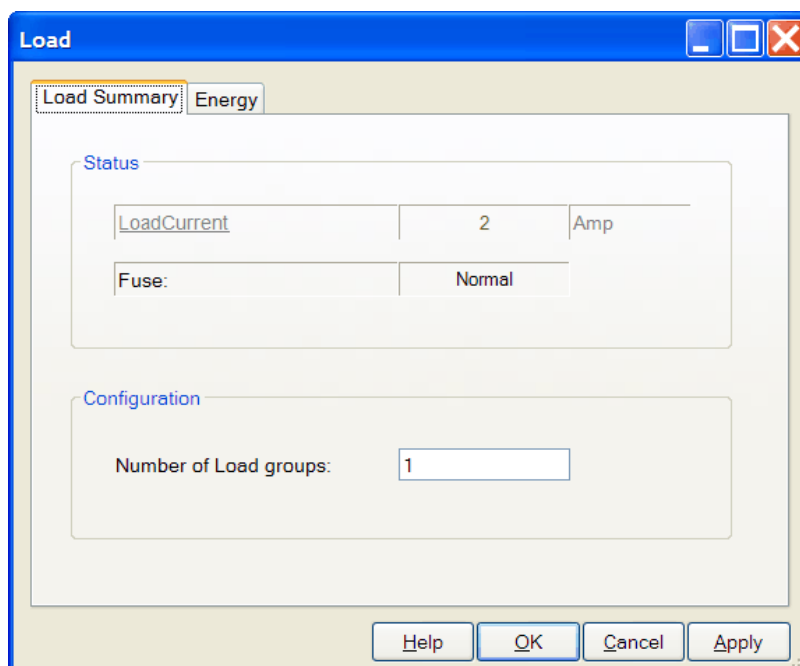
Information about the functionality for the whole power system's DC load is gathered in this dialogue box.

Click on the actual tab to display its data.



Load Summary tab

The "**Load Summary**" tab in this dialogue box displays the **status of the alarm monitors** that measure the power system's DC load.



- The “**LoadCurrent**” alarm monitor does not really measure the DC load current. It raises alarms based on the **calculation of the load current** (the difference between the rectifier current “RectifierCurrent” and the battery current “BatteryCurrent”).
Read also the [Load Current Calculation](#) (page 292) topic in the [Functionality Description](#) section.

This alarm monitor is also displayed in the Power Summary pane; see “[Program Window](#)” on page 14.

- The status of the system’s Load Fuses F1, F2, etc.
Status “Normal” means that none of the system’s load fuses are open nor tripped.

NOTICE:

Generally, the number of load groups in a system is “1”, as one controller usually manages one load group.
The power system’s total load is then considered as a load group.

Read more about [Load Groups](#) (page 289), in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

You can **click on the displayed alarm monitor links** to view or edit the monitors’ parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

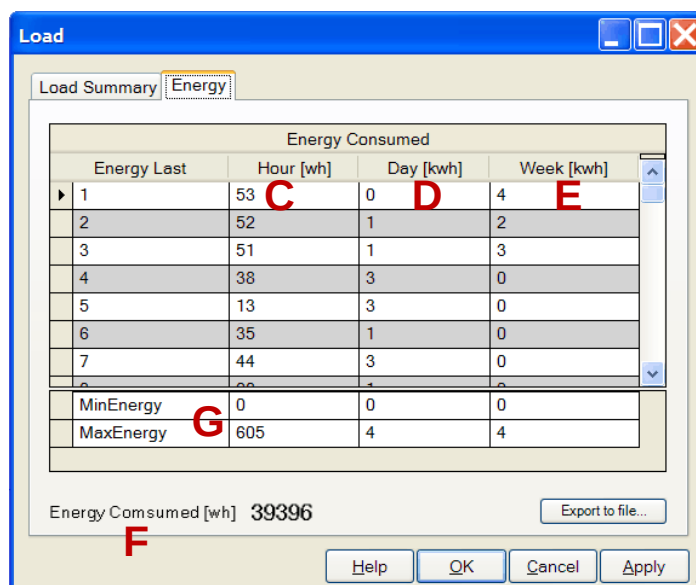
Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

Energy tab - Load

This dialog box is displayed by double-clicking on the **Load icon** in the **Power Explorer pane**, and then clicking on the “**Energy**” tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of dialog box with the load's Energy Log.

The “Energy” tab displays the load’s “Energy Log”, which is a *measurement log* that records **the energy delivered to the system’s DC load**, (Wh).

The controller logs the **energy consumed** by the DC load during the **last hour (C)**, during the **last day (D)** and during the **last week (E)**.

Also, the controller logs the **total (F)**, **minimum and maximum (G) energy consumed** or used by DC load since the first system start-up.

The system controller stores the latest 52 calculations, which can be displayed by the Energy Log.

You find more graphical, detailed description in the “Energy Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description section](#).

Clicking on the “**Export to file**” button, enables to save the Energy Log in XML format to a computer.

Notice that to be able to monitor the energy provided through a specific load fuse, a load monitor must be connected to the system. Read more in topics [Load Monitor Energy Log](#) (page 236) and [The Load Monitor Control Unit - Overview](#) (page 361), in the [Functionality Description section](#).

Load Group nn dialog box

This dialog box is displayed by double-clicking any of the **Load Group icons** in the **Power Explorer pane**.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

Read more about [Load Groups](#) (page 289), in the [Functionality Description section](#).

Load group Summary			
Status			
LoadFuse 1	Normal	Diode Matrix	0 A
LVLD 1.1	Disabled		
LVLD 1.2	Disabled		
LVLD 1.3	Disabled		
Configuration			
Number of LVLDs:		3	

The “Load Group nn” dialogue box **displays the status** of the **Load Fuse alarm monitor** and of the system’s **LVLD contactors**:

- Status “Normal” means that the system’s Load Fuses are not open nor tripped.
Status “Major” or “Minor” is displayed when the Load Fuses are open or tripped, and the Fuse alarm monitor is in alarm.
You can click on the “LoadFuse X” alarm monitor to view or edit the monitor’s parameters.
- The status of the system’s LVLD contactors
Status “Normal” means that the contactor is not tripped.
Clicking on the “LVLD x.x” link, you can open the “[LVLD dialog box](#)” on page 103, where you can configure the contactor.

NOTICE:

Normally, the power system must be equipped with more than one controller to support several LVLD contactors.

You can **click on the displayed alarm monitor links** to view or edit the monitors’ parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Load Primary nn dialog box

This dialog box is displayed by double-clicking on the **Load Primary nn icon** (Load Monitor nn), in the **Power Explorer pane**, under the Load group.

The icon will only be displayed if a load monitor module is physically connected to the CAN bus. Read more in topic [The Load Monitor Control Unit - Overview](#) (page 361), in the [Functionality Description](#) section.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

Click on the actual tab to display its data.

Monitor View tab – Load Primary

The screenshot displays the 'LoadPrimary 2' dialog box with the 'Monitor View' tab selected. It shows various current and energy measurements. Two smaller windows, 'LoadPrimary 2 Energy log' and 'LoadPrimary 2.1 Energy log', are also shown, displaying detailed energy consumption data over time.

Energy Last	Hour [wh]	Day [kwh]	Week [kwh]
1	3431	0	268
2	3431	81	202
3	3431	78	284
4	3431	49	134
5	3431	0	82
6	3431	0	46
7	3431	79	21
8	3430	78	91
9	0	77	9
10	3431	78	1
MinEnergy	0	0	0
MaxEnergy	7248	143	284

Energy Last	Hour [wh]	Day [kwh]	Week [kwh]
1	2777	0	221
2	2777	66	164
3	2777	64	235
4	2777	40	235
5	2777	0	357
6	2777	0	208
7	2777	64	96
8	2779	64	373
9	0	64	475
10	2777	64	176
MinEnergy	0	0	0
MaxEnergy	10247	145	951

This dialogue box displays the status of the “Load Current nn” and “Current X.X” alarm monitors and respective “Energy Logs”:

- The **total current measured** (A) by the load monitor's current sense inputs.
The “LoadCurrent nn” alarm monitor **does not really measure** the load current, but generates alarms based on the addition of the current measurements performed by the individual “Current X.X” alarm monitors
- The **current measured by each current sense input** (B) in the actual load monitor.
E.g.: alarm monitor “Current 2.3” monitors current sense input #3 implemented in Load Monitor #2.
Notice that to achieve **accurate measurements**, the “Current X.X” alarm monitors must be **correctly calibrated and scaled**.

You can click on the “LoadCurrent nn” and the “Current X.X” alarm monitor links to view or edit and calibrate the monitors’ parameters.

The **max. value of the current shunt** used by each current sense input is also displayed (G)

- Click on the “**Energy**” buttons (C) to open the “Energy Logs” dialog boxes for the individual current sense inputs.
Each of the “Current X.X” Energy Logs displays the **energy usage/delivered via the load output** monitored by the actual current sense input, (Wh).
The “Load Current nn” Energy Log displays the **energy usage/delivered via ALL the load outputs** monitored by the load monitor.
- The “**Energy Logs**” dialog boxes (*measurement logs*) show the **energy** provided via the actual output to the load during the **last hour**, during the **last day** and during the **last week**.
It also displays the **total (D)(E), minimum and maximum energy** provided via the actual output to the load since the first system start-up.
The system controller stores the latest **52 sets of measurements** or calculations, which can be displayed by the Energy Log.
Clicking on the “**Export to file**” button, enables to save the Energy Log in XML format to a computer.

Read more in topic [Load Monitor Energy Log](#) (page 236), in the [Functionality Description](#) section.

You find more graphical, detailed description in the “Energy Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description](#) section.

You can **click on the displayed alarm monitor links** to view or edit the monitors’ parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

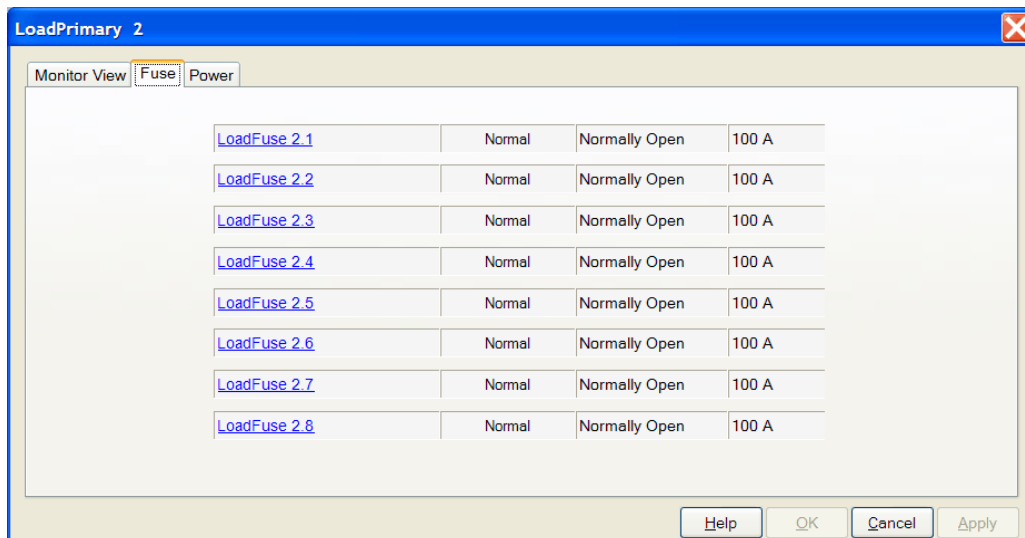
Fuse tab – Load Primary

This dialog box is displayed by double-clicking on the **Load Primary nn icon** (Load Monitor nn), in the **Power Explorer pane**, under the Load group, and then clicking on the “**Fuse**” tab.

The dialog box may display more tabs than shown in the example.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.



The “**Fuse**” tab in this dialogue box **displays the status** of the **Load Fuse alarm monitors** used with the Load Monitor’s Fuse Monitoring inputs.

E.g.: Alarm monitor “LoadFuse 2.3” monitors Fuse Monitoring input #3 implemented in Load Monitor #2.

- The dialog box displays 3 columns with the alarm monitor’s **Status** (Normal), **Configuration** (Normally Open)) and **Fuse Size** (100A) for each of the Load Fuse alarm monitors.

You can **click on the displayed alarm monitor links** to view or edit the monitors’ parameters.

Click on the **Apply** button to activate the changes you entered, then on the **OK** button.

Read topic “[Alarm Monitor dialog boxes](#)” on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

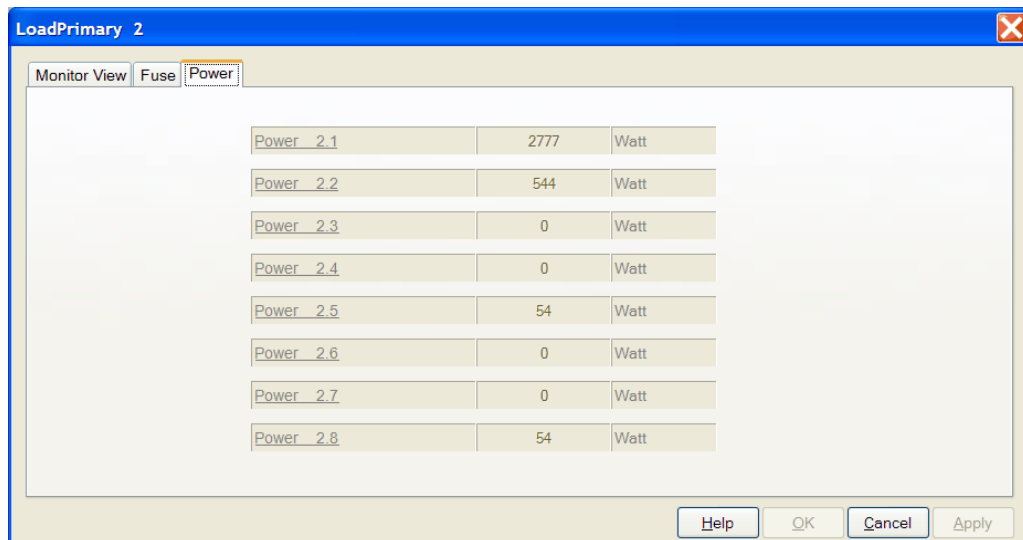
Power tab – Load Primary

This dialog box is displayed by double-clicking on the **Load Primary nn icon** (Load Monitor nn), in the **Power Explorer pane**, under the Load group, and then clicking on the “**Power**” tab.

The dialog box may display more tabs than shown in the example.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.



This dialogue box **displays the status** of the “**Power X.X**” alarm monitors used with the Load Monitor’s Current Sense inputs.

E.g.: Alarm monitor “Power 2.3” monitors Current Sense input #3 implemented in Load Monitor #2.

- The **power delivered via the load output** monitored by the actual current sense input, (W).

The “**Power X.X**” alarm monitor **does not really measure, but calculates** the power delivered using the factors: the output voltage and the current -- measured by the individual “**Current X.X**” alarm monitors.

- You can click on the “**Power X.X**” alarm monitor links to view or edit the monitors’ parameters to configure alarms, etc.

Read more in topic [Load Monitor Energy Log](#) (page 236), in the [Functionality Description section](#).

You find more graphical, detailed description in the “Energy Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description section](#).

Read topic “[Alarm Monitor dialog boxes](#)” on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Sub-Dialog Boxes ~ Load

These sub-dialogue boxes are displayed by clicking on buttons or links that you find in load related dialogue boxes.

LVLD dialog box

This dialog box is displayed by clicking on the “LVLD” alarm monitor link, which you find in the **Load Group dialog box**.

LVLD 1.1

LVD Configuration

☒ Enable ☐ Mains independent

Disconnect Voltage[V]: 44.00

Reconnect Voltage[V]: 48.00

Note:
Changing disconnect voltage will lead to reconnect voltage being changed automatically if no new value is set for it. The difference between disconnect voltage and reconnect voltage will then remain the same as before setting the disconnect voltage.

Disconnect Delay Time [minutes]: 30 ☐ Enable

Delay after Disconnect[seconds]: 0

Description: LVLD 1.1

Alarm group: LVLD1

This special alarm monitor dialog box enables you to configure the system’s LVLD contactor.

- **Select suitable parameters**
(click on the links below for a description)
- **Click on the Enable box** to activate the parameters (checked)
- **Click on the Apply button**, to save the changes

Read more about the topics [Alarm Monitors](#) (page 324) and [LVLD ~ Non-Priority Load Disconnection](#) (page 291), in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

[<<< Back to the “Load Group nn dialog box” on page 97](#)

Enable

Check this option to activate or enable the alarm monitor, so that it functions according to the entered parameters in the other fields.

Removing the check mark disables the alarm monitor, and it will not function, regardless of the data entered in the other fields.

Mains Dependency

Mains Independent

Check this option if you want that the LVLD alarm monitor will reconnect the LVLD contactor when the rectifier system output voltage reaches the Reconnect Voltage limit, regardless whether Mains is ON or OFF. For example, this is possible using an additional primary supply.

Read more about the topic [LVLD ~ Non-Priority Load Disconnection](#) (page 291), in the [Functionality Description](#) section.

Uncheck this option (Mains dependent) if you want that the LVLD alarm monitor will NOT reconnect the LVBD contactor until Mains is ON again.

Disconnect and Reconnect Voltages

Use the keyboard to edit the alphanumeric field.

Disconnect Voltage

Enter a numeric value for the battery voltage drop-down limit. When -- after a Mains failure -- the battery voltage gradually drops down to this limit; then the alarm monitor raises the alarm and trips the LVLD contactor. Use the units indicated in the field.

Reconnect Voltage

Enter a numeric value for the battery voltage reconnection limit. When the Mains supply is ON again, the rectifier system output voltage increases to this limit; then the alarm monitor will reconnect the LVLD contactor. Use the units indicated in the field.

Disconnect Delay Time

Enter the **number of minutes since the Mains outage** before the alarm monitor trips or disconnects the LVLD contactor. This is the leasing backup time for the non-priority load.

Delay after Disconnect

Enter the **Time delay or number of seconds** the LVLD contactor has to be tripped or disconnected, before the alarm monitor is allowed to reconnect the LVLD contactor.

Description

It is not advisable to change the name of this system alarm monitor.

Changing the description text is useful with logical alarm monitors, used with programmable inputs. But it is not advisable to change the description of other system alarm monitors.

If you must, click in the **Change** button and edit the text in the field.

Alarm Group

Use the drop-down list.

- Select the predefined Alarm Output Group that you want the alarm monitor to activate

Battery

The system's battery banks are displayed in the Power Explorer pane either in the Battery Bank view or in the String view. You can select the appropriate view in the “[Options dialog box](#)” on page 31.

Read about [Overview Battery Measurements](#) (page 295), in the [Functionality Description](#) section.

Following dialog boxes are used to interact with DC power supply system, and configure it with battery related parameters.

Battery dialog box

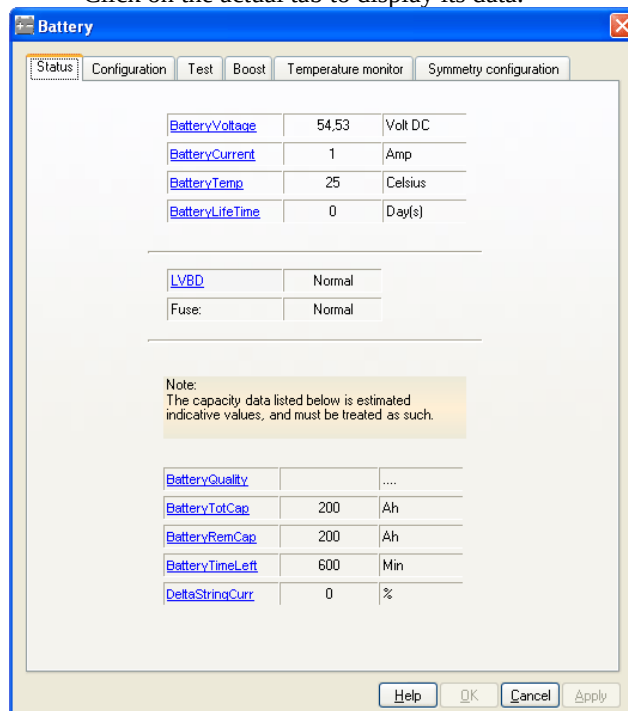
This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

The configuration of the battery functionality that applies to the whole DC power system is gathered in this dialogue box.

Click on the actual tab to display its data.

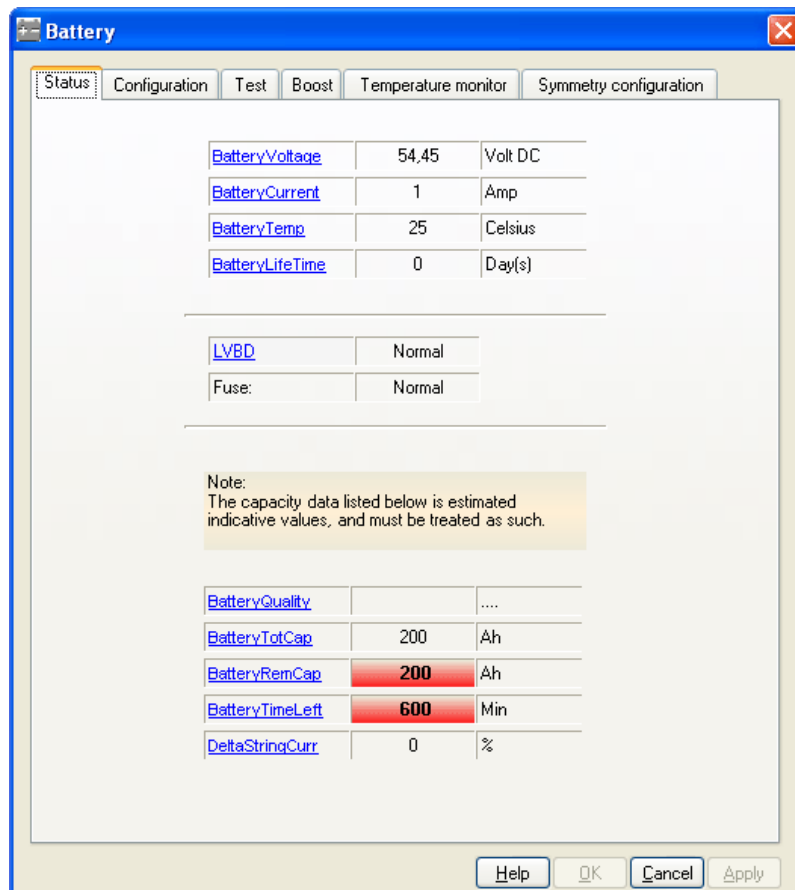


Status tab

The “**Status**” tab in this dialogue box displays the **status of the alarm monitors** that measure the system battery (all connected battery banks) for the whole DC power system.

The dialog box may display more tabs than shown in the example.

Read about [Overview Battery Measurements](#) (page 295), in the [Functionality Description](#) section.



This dialogue box displays the status of the system's battery bank measurements carried out several alarm monitors, and the status of the battery fuses and LVBD contactors:

- The system battery's Voltage SB, measured by alarm monitor "**BatteryVoltage**" is used to generate alarms
- The system battery's Current SB. The "**BatteryCurrent**" alarm monitor does not really measure the battery current, but generates alarms based on the **addition** of the current measurements performed by the **individual battery current alarm monitors**; see "[Currents dialog box](#)" on page 127.

This alarm monitor is also displayed in the Power Summary pane; see "[Program Window](#)" on page 14.

- The system battery's Temperature, The "**BatteryTemp**" alarm monitor uses the highest temperature measurement performed by the individual "BatteryTemp 1.1" and "BatteryTemp 1.2" alarm monitors, that you find in "[Temperatures dialog box](#)" on page 129

This alarm monitor is also displayed in the Power Summary pane; see "[Program Window](#)" on page 14.

- The system battery's Lifetime Monitor, measured by alarm monitor "**BatteryLifeTime**". The monitor supervises the total number days the battery bank has been within the specified ranges. Read also "[Temperature Monitor tab](#)" on page 121.

- The status of the system's LVBD contactor
Status "Normal" means that the contactor is not tripped.
Clicking on the LVBD link, you can open the "[LVBD dialog box](#)" on page 134, where you can configure the contactor.
- The status of the system's Battery Fuses Fb1, Fb2, etc.
Status "Normal" means that none of the system's fuses are open nor tripped.
- The system battery's quality and total capacity, measured by alarm monitors "**BatteryQuality**" and "**BatteryTotCap**". These alarm monitors are used when battery testing against the "Current Ref 1" parameters in the battery definition tables.
Read about [Battery Tables](#) (page 308), in the [Functionality Description section](#)
- The system battery's remaining capacity, measured by alarm monitors "**BatteryRemCap**" and "**BatteryTimeLeft**". These alarm monitors are used when battery testing against the "Current Ref 2" parameters in the battery definition tables.
Read about [Battery Tables](#) (page 308), in the [Functionality Description section](#)
- The system battery's Discontinuance Battery Test, measured by alarm monitor "**DeltaStringCurr**". The monitor presents the Discontinuance Battery Test result as a percent digit. Read also "[Discontinuance Battery Tests](#)" on page 113.

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

You can **click on the displayed alarm monitor links** to view or edit the monitors' parameters.

Also, **right-click on the Battery Voltage alarm monitor link** and select "**Calibrate**", to open the alarm monitor's dialog box displaying the *Calibration* tab, thus enabling voltage calibration.

Read topic "[Alarm Monitor dialog boxes](#)" on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

Configuration tab

This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**, and then clicking on the "**Configuration**" tab.

The dialog box may display more tabs than shown in the example.

Battery

Configuration

Battery size

Number of banks: 1

Number of strings [#]: 3

Battery type

Description: Eltek Std

Capacity [Ah per string]: 100

Battery install date: 11. januar 2005

Edit battery table...

Temperature compensation

Current limitation

☒ Activate temperature compensation

Reference voltage [V]: 53,52

Reference voltage [V/cell]: 2,2300

Reference temperature [C]: 8

Temperature slope [mV/C/cell]: 3,00

Min compensation voltage [V/cell]: 2,1000

Max compensation voltage [V/cell]: 2,3500

Help OK Cancel Apply

- Select or change the parameters in
 - **Battery Size** section
 - **Battery Type** section
 - **Temperature Compensation** sub-tab
 - **Current Limitation** sub-tab

and

- Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Battery Size section

- Click on the “**Number of Banks**” text box and type the number of battery banks connected to the DC power system, e.g. “1”
- Click on the “**Number of Strings**” text box and type the total number of battery strings connected to the DC power system, e.g. “3”

NOTICE: Generally the number of battery banks is the same as the number of controllers in the system. Enter “1” battery bank in systems with one controller. Enter “2” battery banks in distributed systems with two controllers, where both are used for battery current monitoring.

PowerSuite uses this information for battery capacity calculations.

Read also about [Battery Banks, Strings and Blocks](#) (page 294), in the [Functionality Description](#) section.

Battery Type section

- Select the type of battery bank used by the system, by clicking on the “**Edit Battery Table**” button and selecting the correct Battery Definition Table.
The Definition text box will be automatically filled in after you have selected a battery definition table.
Refer to the “[Battery Table Data dialog box](#)” on page 136
- Click on the “**Capacity (Ah per string)**” text box and type the total number ampere-hours per battery string
- Click on the “**Battery Install Date**” drop-down arrow and in the calendar, click on the date the battery bank was installed.
To navigate in the calendar:
-- **Select a month** by clicking on the right or left arrow buttons to browse forward or backwards through the calendar months
-- Select **today’s date** by clicking on the orange square at the bottom of the calendar

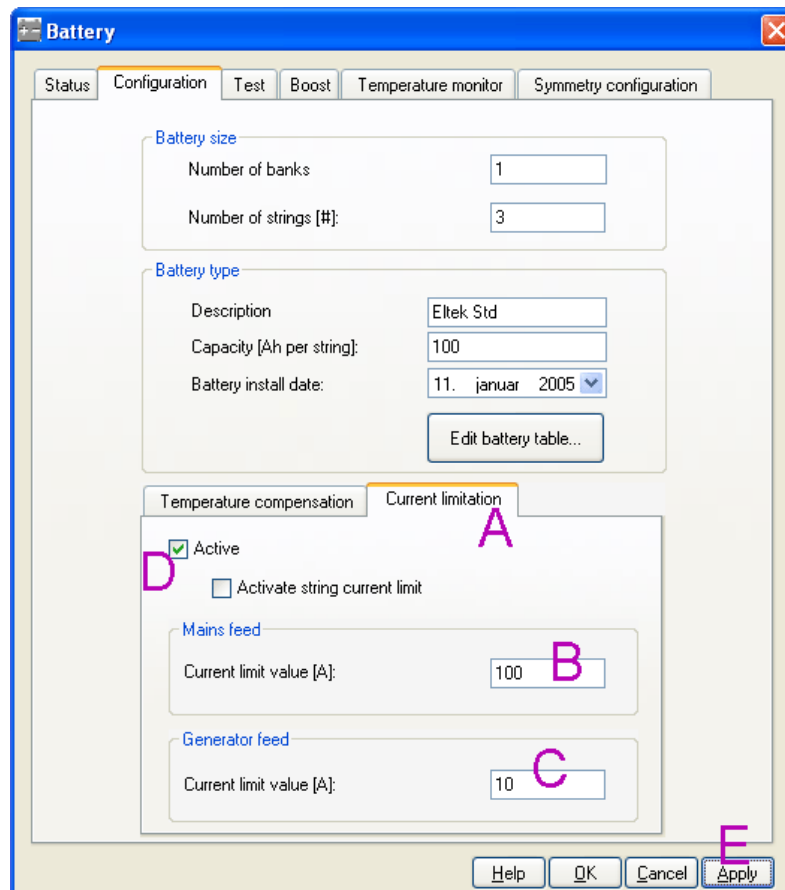
Temperature Compensation sub-tab

- Click on the “**Reference Voltage (V/Cell)**” text box and type the charging voltage per battery cell, at the reference temperature specified in the “Reference Temperature (C)” text box, as recommended by the battery manufacturer
 - Click on the “**Reference Temperature (C)**” text box and type the reference temperature in degrees Centigrade, that the battery manufacturer has specified for the charging voltage entered in the “Reference Voltage (V/Cell)” text box
 - Click on the “**Temperature Slope (mV/°C/Cell)**” text box and type how many millivolts per battery cell per degree Centigrade that the battery manufacturer has recommended as compensation factor for the specific type of batteries.
 - Click on the “**Min Compensation Voltage (V/Cell)**” text box and type the minimum charging voltage per battery cell (used for protection of connected load equipment)
 - Click on the “**Max Compensation Voltage (V/Cell)**” text box and type the maximum charging voltage per battery cell (used for protection of connected load equipment)
- and
- Click on the “**Activate Temperature Compensation**” box (checked) to enable Temperature Compensated Charging parameters.
Clicking again on the box (unchecked) will disable the parameters.
After clicking on the Apply button, the function will be activated on the controller

Read also about [Temperature Compensated Charging](#) (page 315), in the [Functionality Description](#) section.

Current Limitation sub-tab

Click on the “**Current Limitation**” tab (A), in the middle of the dialog box.



- Click on the *Mains Feed* “**Current Limit Value (A)**” text field (B) and type the maximum number of amperes allowed for charging the battery bank, when the power system is fed from the AC mains supply, e.g. <100>
- Click on the *Generator Feed* “**Current Limit Value (A)**” text field (C) and type the maximum number of amperes allowed for charging the battery bank, when the power system is fed from an external generator, e.g. <10>
- Click on the “**Active**” box (D) (checked) to enable the battery charging current limitation parameters. Clicking again on the box (unchecked) will disable the parameters. After clicking on the Apply button (E), the function will be activated on the controller

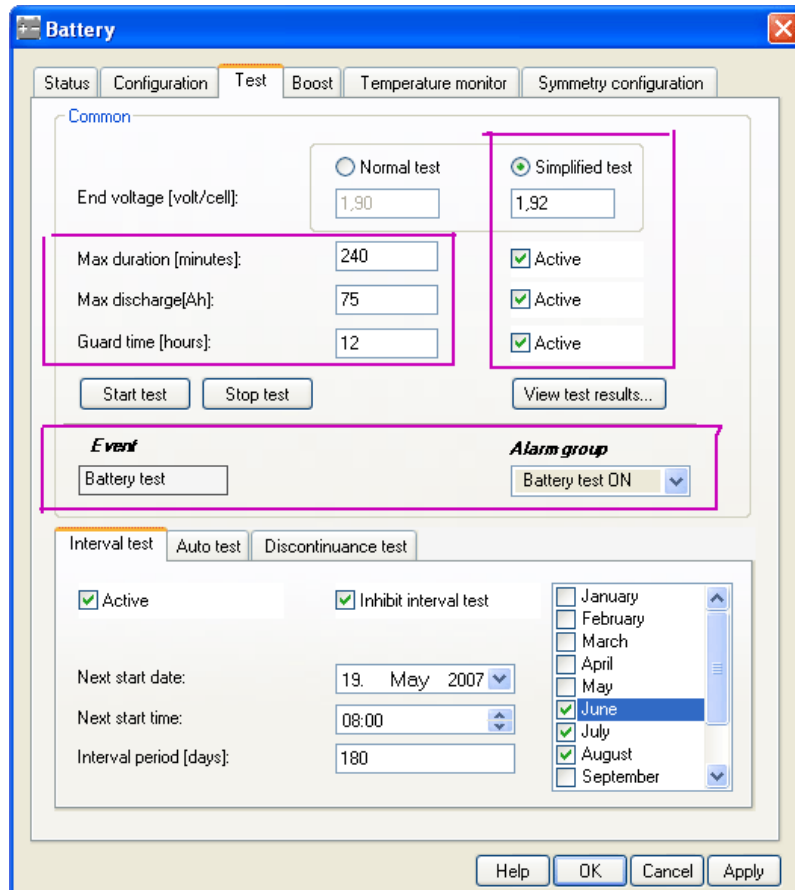
Read also [Battery Charging Current Limitation](#) (page 317), in the [Functionality Description](#) section.

You may also find interesting to read the tutorial “[How to Configure Alarm Monitors & Programmable Inputs](#)” on page 176.

Test tab

This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**, and then clicking on the “**Test**” tab.

The dialog box may display more tabs than shown in the example.



In this dialogue box you can configure and schedule **3 types of battery tests**:

- Simplified Battery Tests
- Normal Battery Tests
- Discontinuance Battery Tests

To configure and schedule a battery test, you have to:

- Select or change the
 - **Type of battery test**
 - Test **starting method** and parameter
 - Test **duration parameters**
 - Test **termination parameters**
 - Test **Alarm Group**

and

- Click on the **Apply** button to activate the changes, then on the **OK** button

Read also the chapter [Battery Tests](#) (page 310), in the [Functionality Description section](#).

You can also click on the “**View Test Results...**” button to display the results of the battery tests. Topic [Battery Test Results dialog box](#), page 138, describes how the results are presented.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Simplified Battery Tests

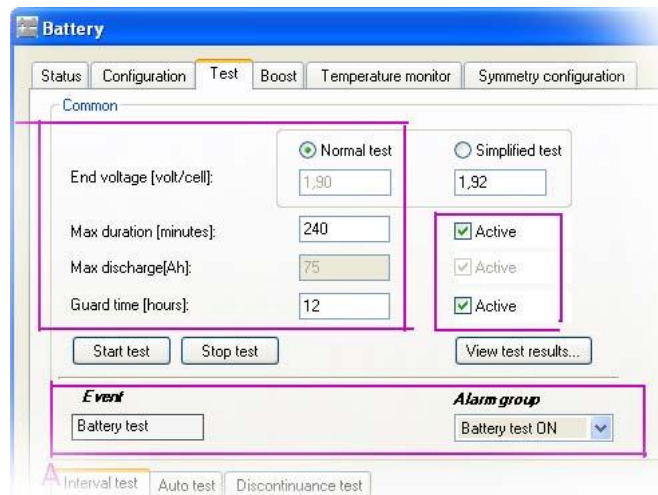
To configure and schedule the start of a Simplified Battery Test, get the correct values in the battery definition table and do following:

- Click on the “**Simplified Test**” radio button (checked) to select the battery test.
- Click on the “**End Voltage (volt/cell)**” text field, under the “Simplified Test” radio button, and type the test’s end-of-discharge voltage e.g. <1.92>
- Click on the “**Max Duration (minutes)**” text field and type the number of minutes the test will last e.g. <240>
- Click on the “**Max Discharge (Ah)**” text field and type the maximum number of ampere-hours that the battery can be discharged e.g. <75>
- Click on the “**Guard Time (hours)**” text field and type how many hours, after the last AC mains outage, a battery test initiation shall be delayed, e.g. <12>
Maximum time is 1000 hours or 41.6 days.
Read more in chapter [Battery Test Start Methods](#) (page 312), in the [Functionality Description](#) section.
- Click on the 3 “**Active**” boxes (checked) to enable the battery test parameters.
Clicking again on the boxes (unchecked) will disable the parameters.
- Click on the “**Alarm Group**” drop-down arrow and select a pre-defined Alarm Output Group to be activated while the test is running, e.g. <Battery test ON>.
Relay outputs assigned to the “Battery test ON” Alarm Output Group will be activated while the test is running. Refer to tutorial “[How to Configure Alarm Output Groups](#)” on page 174.
- Continue selecting the battery test start method, as described in chapter “[Test Start Method: Manual, Interval & Auto](#)” on page 115.

Read more about [Types of Battery Tests](#) (page 311), in the [Functionality Description](#) section.

Normal Battery Tests

To configure and schedule the start of a Normal Battery Test, get the correct values in the battery definition table and do following:



- Click on the “**Normal Test**” radio button (checked) to select the battery test.

The “End Voltage (volt/cell)” text field, under the “Normal Test” radio button, is deactivated, as the end-of-discharge voltage is automatically entered from the selected battery definition table.

- Click on the “**Max Duration (minutes)**” text field and type the number of minutes the test will last e.g. <240>

The “Max Discharge (Ah)” text field is deactivated, as the maximum number of ampere-hours that the battery can be discharged is automatically entered from the selected battery definition table.

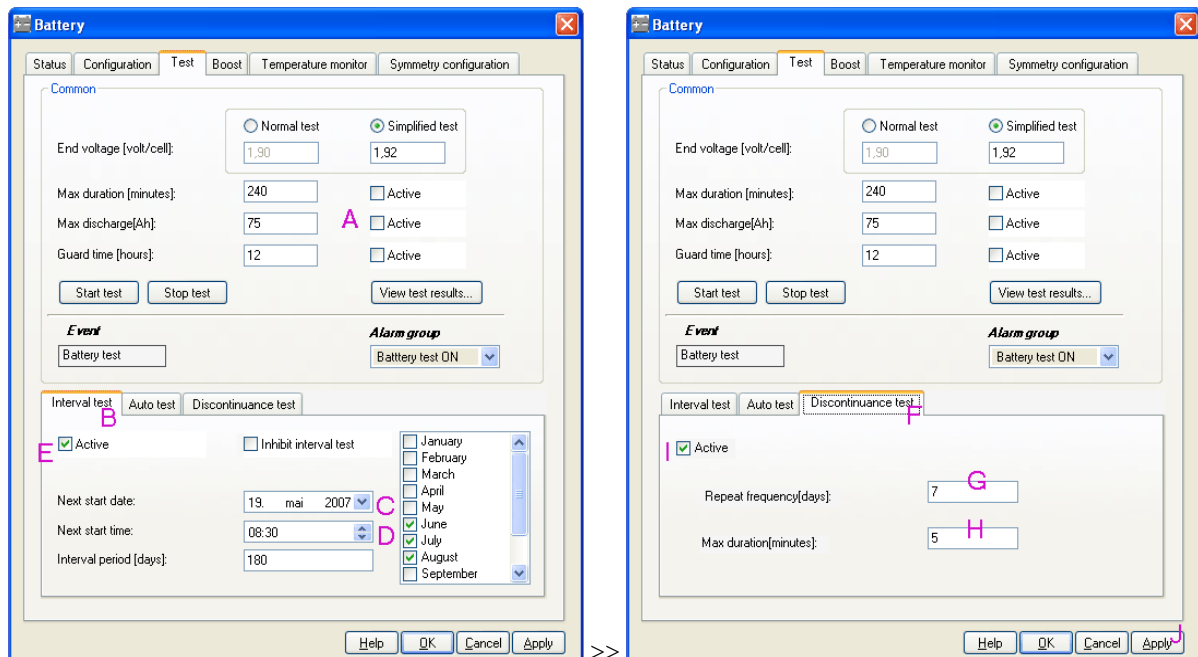
- Click on the “**Guard Time (hours)**” text field and type how many hours, after the last AC mains outage, a battery test initiation shall be delayed, e.g. <12>
Maximum time is 1000 hours or 41.6 days
Read more in chapter [Battery Test Start Methods](#) (page 312), in the [Functionality Description](#) section.
- Click on the 2 “**Active**” boxes (checked) to enable the battery test parameters.
Clicking again on the boxes (unchecked) will disable the parameters.
- Click on the “**Alarm Group**” drop-down arrow and select a pre-defined Alarm Output Group to be activated while the test is running, e.g. <Battery test ON>.
Relay outputs assigned to the “Battery test ON” Alarm Output Group will be activated while the test is running. Refer to tutorial “[How to Configure Alarm Output Groups](#)” on page 174.
- Continue selecting the battery test start method, as described in chapter “[Test Start Method: Manual, Interval & Auto](#)” on page 115.

Read more about [Types of Battery Tests](#) (page 311), in the [Functionality Description](#) section.

Discontinuance Battery Tests

Read also the chapter [Discontinuance Battery Test](#) (page 314), in the [Functionality Description](#) section.

- Notice that the Discontinuance Battery Test is a **string current measurement method**; the end-voltage parameters and Normal and Simplified Test radio buttons are irrelevant to the test.
- The Normal and Simplified Battery Tests have **starting priority** over the Discontinuance Battery Test.
- The Discontinuance Battery Test parameters are configured in the “**Interval Test**” and the “**Discontinuance Test**” sub-tabs.
- The Discontinuance Battery Test uses the parameter in the “Repeat Frequency (days)” field (G), in the “Discontinuance Test” sub-tab. The “Interval Period (days)” field parameter, in the “Interval Test” sub-tab, is irrelevant to the Discontinuance Battery Test, but should always be higher than the parameter in field (G).
- The Discontinuance Test **will not start**, if the total **battery current is less than 5% of the shunt value**, thus avoiding false alarms.



To configure and schedule the start of a Discontinuance Battery Test, do following:

- Click on the 3 “**Active**” boxes (unchecked) (A) to **disable** the Max. Duration, Discharge and Guard Time battery test parameters.
- Click on the “**Alarm Group**” drop-down arrow and select a pre-defined Alarm Output Group to be activated while the test is running, e.g. <Battery test ON>.
Relay outputs assigned to the “Battery test ON” Alarm Output Group will be activated while the test is running. Refer to tutorial “[How to Configure Alarm Output Groups](#)” on page 174.
- Click on the “**Interval Test**” sub-tab (B) to schedule the test.
- Click on the “**Next Start Date**” drop-down arrow (C) and in the calendar, click on the date the battery test shall be initiated.

To navigate in the calendar:

-- **Select a month** by clicking on the right or left arrow buttons to browse forward or backwards through the calendar months

-- Select **today's date** by clicking on the orange square at the bottom of the calendar

- Select the test start time in the “**Next Start Time**” field (D), by:
 - Clicking on the **hour digits before the colon**, and then clicking on the up-or-down arrow button (D) to roll the hours upwards or downwards.
 - Clicking on the **minute digits after the colon**, and then clicking on the up-or-down arrow button (D) to roll the minutes upwards or downwards.
- If necessary, click on the “**Active**” box (unchecked) (E) to **disable the “Interval Test”**. Only the “Discontinuance Test” must be enabled.
- Click on the “**Discontinuance Test**” sub-tab (F) to configure the test duration parameters.
- Click on the “**Repeat Frequency (days)**” text field (G) and type how often, in days, the test shall be repeated, e.g. <7> (between 0 and 7)
Note that this parameter should be lower than the “Interval Period (days)” field parameter, in the “Interval Test” sub-tab.
- Click on the “**Max. Duration (minutes)**” text field (H) and type how minutes the test shall last, e.g. <5> (between 1 and 10)
- Click on the “**Active**” box (checked) (I) to enable the battery test starting schedule.
- Click on the **Apply** button (J) to activate the changes, then on the **OK** button

Read also the chapter [Discontinuance Battery Test](#) (page 314), in the [Functionality Description](#) section.

Test Start Method: *Manual, Interval & Auto*

You have **3 different methods to initiate** battery tests:

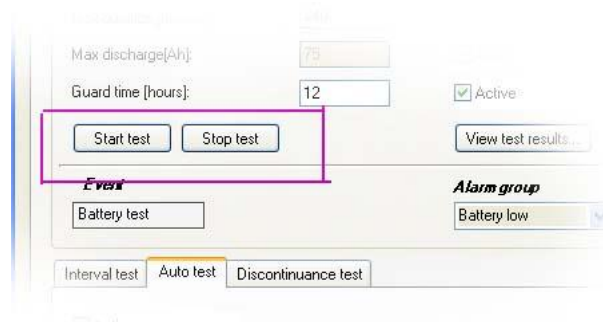
- Manual start method
- Interval start method
- Automatic start method

The Discontinuance Start Method is only used to enable and initiate a Discontinuance Battery Test.

Read also the chapter [Battery Test Start Methods](#) (page 312), in the [Functionality Description](#) section.

Manual Start

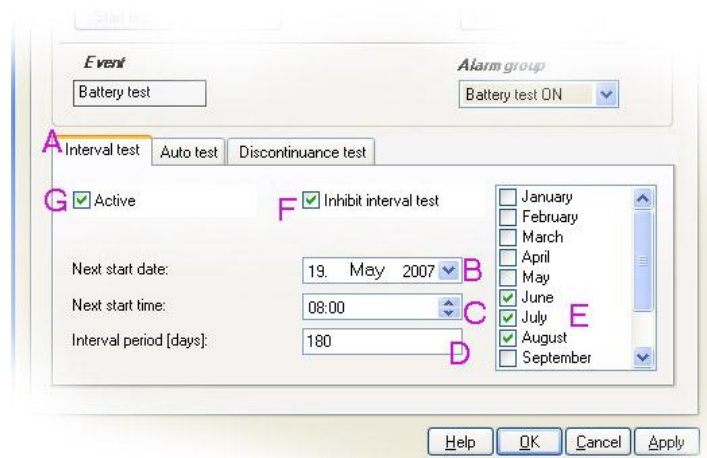
To manually start and stop a Normal or a Simplified battery test, do the following:



- Click on the “**Start Test**” button to immediately start the battery test. The *PowerSuite* status bar, at the bottom of the main program window will display “Mode: MANUAL TEST”.
- Click on the “**Stop Test**” button to immediately stop the running battery test. The *PowerSuite* status bar, at the bottom of the main program window will again display “Mode: FLOAT”.

Interval Test sub-tab

To schedule the automatic start of a battery test (Simplified, Normal or Discontinuance tests) at a specified date and time, and repeat the test at a specified intervening period of time, do following:



- Click on the “**Interval Test**” sub-tab (A) to schedule the test.
- Click on the “**Next Start Date**” drop-down arrow (B) and in the calendar, click on the date the battery test shall be initiated. To navigate in the calendar:
 - **Select a month** by clicking on the right or left arrow buttons to browse forward or backwards through the calendar months
 - Select **today’s date** by clicking on the orange square at the bottom of the calendar
- Select the test start time in the “**Next Start Time**” field (C), by:
 - Clicking on the **hour digits before the colon**, and then clicking on the up-or-down arrow button (C) to roll the hours upwards or downwards.
 - Clicking on the **minute digits after the colon**, and then clicking on the up-or-down arrow button (C) to roll the minutes upwards or downwards.

- Click on the “**Interval Period (days)**” text field (D) and type how often, in days, the test shall be repeated, e.g. <180>
- Click on the check boxes (checked) (E) for **months that you want to inhibit** the test. You can exclude the test a maximum of 3 month every year.
- Click on the “**Inhibit Interval Test**” box (checked) (F) to enable the exclusion of the months you have checked.
- Click on the “**Active**” box (checked) (G) to enable the battery test starting schedule.

Auto Test sub-tab

To schedule the automatic start of a Normal or a Simplified battery test when an AC mains supply outage has occurred, do the following:

- Click on the “**Auto Test**” sub-tab
- Click on the “**Active**” box (checked) to enable the auto starting of the battery test.

Discontinuance Test sub-tab

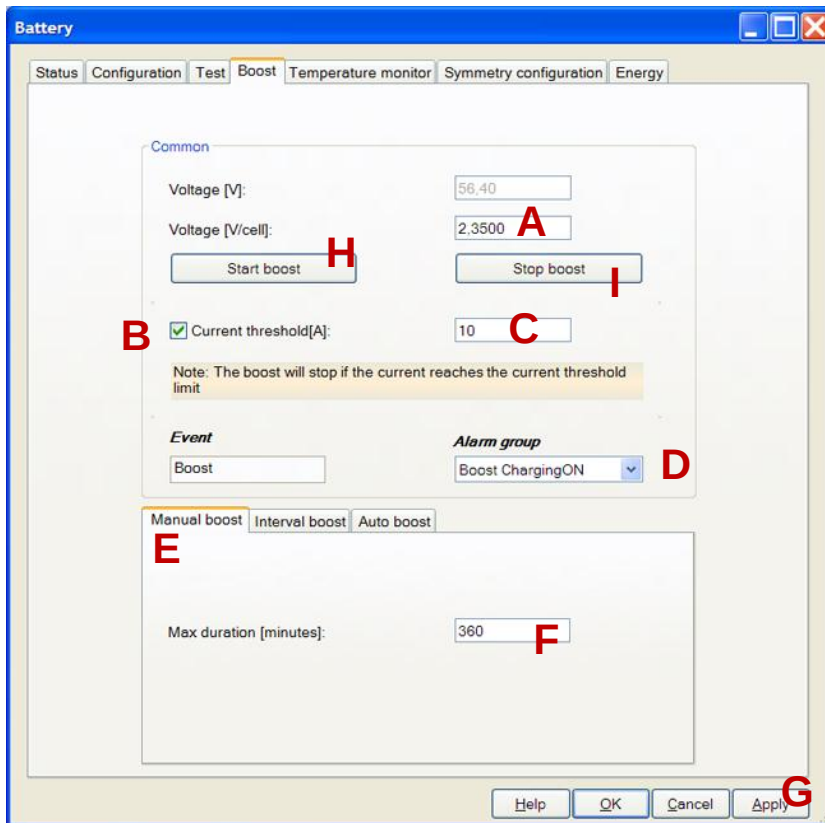
The Discontinuance Start Method is only used to enable and initiate a Discontinuance Battery Test.

Read the “[Discontinuance Battery Tests](#)” on page 113.

Boost tab

This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**, and then clicking on the “**Boost**” tab.

The dialog box may display more tabs than shown in the example.



In this dialogue box you can configure and schedule the Battery Boost Charging.

Battery Boost Charging (Equalizing Charge) is used to reduce the required recharging time by increasing the charging voltage, e.g. between 2.23V/cell to 2.33V/cell.

You have **3 different methods to initiate** battery boost charging:

- Manual start method
- Interval start method
- Automatic start method

To configure and schedule a battery boost charging, you have to:

- Select or change the
 - **Boost Charging Voltage**
 - **Current Threshold** to stop boost charging
 - Boost Alarm Group
 - Boost **starting method** and parameter
- and
- Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Common section

To configure the boost charging common parameters, do following:

- Click on the “**Voltage (V/cell)**” text field (A) and type boost charging voltage, e.g. <2.3500>
Note that the boost charging voltage must always be higher than the battery float voltage and lower than the OVP voltage.
- Optionally, click on the **Current Threshold(A)** box (B) (checked) to enable it, and enter the current threshold value (C) in ampere , e.g. <10>.
Thus, if the battery charging current drops below the Current Threshold level (e.g. 10A), the battery boost charging stops automatically, regardless of the selected Start Method
- Click on the “**Alarm Group**” drop-down arrow (D) and select a pre-defined Alarm Output Group to be activated while battery boost charging is running, e.g. <Boost Charging ON>.
Relay outputs assigned to the “Boost Charging ON” Alarm Output Group will be activated while boost charging is running. Refer to tutorial “[How to Configure Alarm Output Groups](#)” on page 174.
- Continue selecting the battery boost charging start method, as described in the Boost sub-tabs

Manual Boost sub-tab

To configure and manually start and stop battery boost charging, do the following:

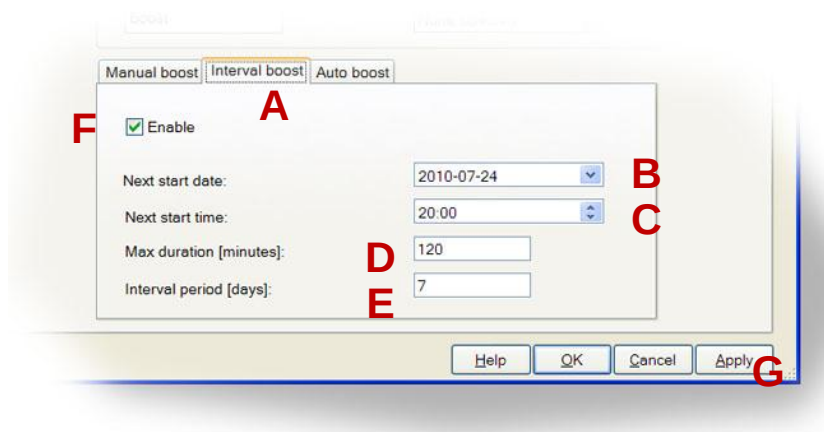
- Click on the “**Manual Boost**” sub-tab (E) to configure the boost charge duration.
- Click on the “**Max. Duration (minutes)**” text field (F) and type maximum number of minutes the boost charging shall last, e.g. <360>, unless stopped manually or automatically by reaching the Current Threshold value (C)
- Click on the **Apply** button (G) to activate the changes,

then
- Click on the “**Start Boost**” button (H) to start boost charging the battery bank.

Click on the “**Stop Boost**” button (I) to stop boost charging the battery bank.

Interval Boost sub-tab

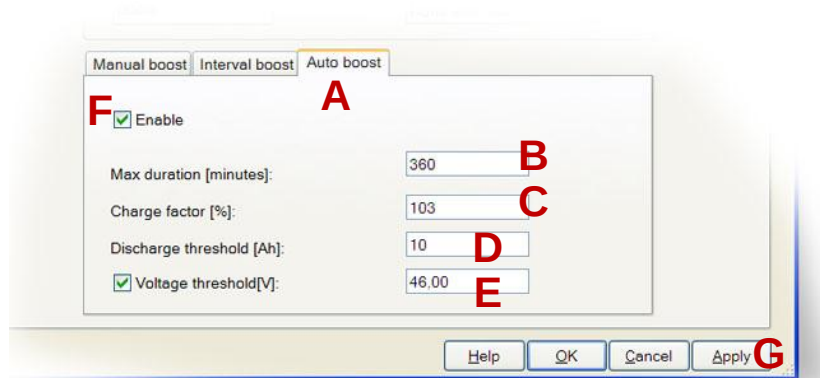
To configure and schedule the automatic start of battery boost charging at a specified date and time, and repeat the boost charging at a specified intervening period of time, do following:



- Click on the “**Interval Boost**” sub-tab (A) to schedule the boost charging
- Click on the “**Next Start Date**” drop-down arrow (B) and in the calendar, click on the date the battery boost charging shall be initiated. To navigate in the calendar:
 - **Select a month** by clicking on the right or left arrow buttons to browse forward or backwards through the calendar months
 - Select **today’s date** by clicking on the orange square at the bottom of the calendar
- Select the boost charging start time in the “**Next Start Time**” field (C), by:
 - Clicking on the **hour digits before the colon**, and then clicking on the up-or-down arrow button (C) to roll the hours upwards or downwards
 - Clicking on the **minute digits after the colon**, and then clicking on the up-or-down arrow button (C) to roll the minutes upwards or downwards
- Click on the “**Max. Duration (minutes)**” text field (D) and type maximum number of minutes the boost charging shall last, e.g. <120>, unless stopped manually or automatically by reaching the Current Threshold value (in the common section)
- Click on the “**Interval Period (days)**” text field (E) and type how often, in days, the boost charging shall be repeated, e.g. <7>
- Click on the “**Enable**” box (checked) (F) to enable the battery charging starting schedule
- Click on the **Apply** button (G) to activate the changes, then on the **OK** button

Auto Boost sub-tab

To configure and schedule the automatic start of battery boost charging, **based on the degree of battery discharge after an AC mains supply outage or after a battery test**, do following:

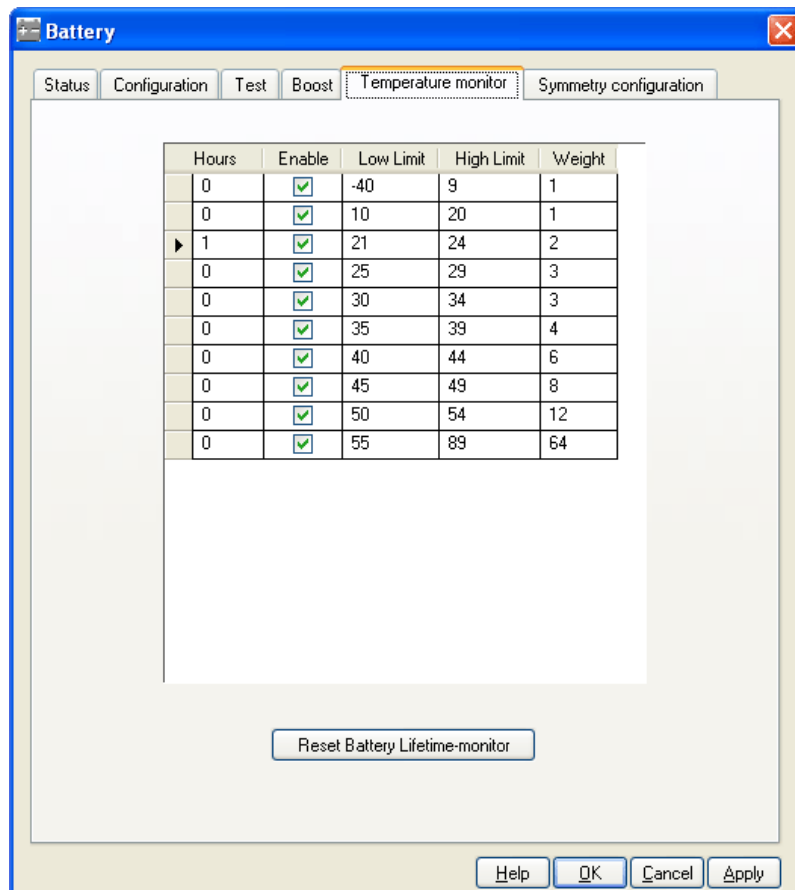


- Click on the “**Auto Boost**” sub-tab (A) to configure the boost charging.
- Click on the “**Max. Duration (minutes)**” text field (B) and type maximum number of minutes the boost charging shall last e.g. <360> (between 0 and 1200); unless stopped automatically by reaching the Charge Factor level or the Current Threshold value (in the common section)
Notice that entering <0> indicates that no duration limit is set, and boost charging will stop when the Charge Factor level or Current Threshold value is reached
- Click on the “**Charge Factor (%)**” text field (C) and type how much to boost charge the batteries **before Auto boost charging stops**. This parameter must be expressed as a percent of how many ampere-hours the batteries were discharged, e.g. <103>.
Notice that the charge factor (or charge in percent of discharge, %) can be from 100% to 150% of discharged ampere-hours.
- Click on the “**Discharge Threshold (Ah)**” text field (D) and type how many ampere-hours the batteries are discharged **before boost charging starts**, e.g. <10> (between 0 and 1000 Ah).
Notice that entering 0 Ah will disable the Auto Boost function.
- Optionally, click on the **Voltage Threshold(V)** box (checked) to enable it, and enter the battery voltage threshold value (E) in volt , e.g. <46.00>
 Thus, if the battery voltage drops below the Voltage Threshold level (e.g. 46.00V), the battery boost charging starts automatically
- Click on the “**Enable**” box (checked) (F) to enable the battery Auto Boost charging starting criteria
- Click on the **Apply** button (G) to activate the changes, then on the **OK** button

Temperature Monitor tab

This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**, and then clicking on the “**Temperature Monitor**” tab.

The dialog box may display more tabs than shown in the example.



- Edit the parameters in the table
 - **Low Limit** column
 - **High Limit** column
 - **Weight** column
- Click on the **Enable** (checked) box for each temperature range
and
- Click on the **Apply** button to activate the changes, then on the **OK** button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

The **Hours** column in the table will automatically display how many hours the system's battery bank has been within the specific temperature ranges.

- Click on the “**Reset Battery Lifetime monitor**” button to set “BatteryLifeTime” alarm monitor's counter to 0 days.
You find the alarm monitor in the “Battery” dialogue box's “[Status tab](#)” on page 105.

Read also [Battery Temperature Levels ~ “BatteryLifeTime” monitor](#) (page 319), in the [Functionality Description](#) section.

Symmetry Configuration tab

This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**, and then clicking on the “**Symmetry Configuration**” tab.

The dialog box may display more tabs than shown in the example.

Battery

Enable/Disable

☒ Enable symmetry

Note: Each symmetry input must be enabled or disabled individually from the symmetry dialog

Symmetry setup

Symmetry voltage[V]: 24

Symmetry mode: Continuous

Discharge Delay [minutes]: 0

Event	Level	Alarm group
Major	1.50	Major alarm
Minor	1.00	Minor alarm

Help OK Cancel Apply

Read also about [Overview Battery Measurements](#) (page 295) and [Available Inputs and Outputs](#) (page 354), in the [Functionality Description](#) section.

The battery symmetry configuration you perform in this dialogue box applies to all the power system’s battery banks.

- Select or change the Symmetry Configuration parameters in
 - Enable / Disable section
 - Symmetry Setup section
 - Event-Level-Alarm Group sectionand
- Click on the Apply button to active the changes, then on the OK button

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Enable / Disable section

- Click on the “**Enable Symmetry**” box (checked) so that *PowerSuite* performs symmetry measurements using all the individually activated alarm monitors in the “[Symmetry dialog box](#)” on page 130

or

- Click again on the “Enable Symmetry” box (unchecked) to deactivate the symmetry measurements.

Symmetry Setup section

Symmetry Voltage

-- Click on the “Symmetry Voltage” drop-down arrow and
 -- Select the voltage specific for the type of symmetry measurement method implemented in the system’s battery bank. Use following voltages for banks implemented with 12V battery blocks:

- 12V for block measurement in 48V systems
- 24V for mid-point measurement in 48V systems
- 24V for double mid-point measurement in 48V systems
- 12V for mid-point or block measurement in 24V systems

For banks not implemented with 12V battery blocks, use the appropriate symmetry voltage.

Read also about [Battery Symmetry Measurements](#) (page 296), in the [Functionality Description section](#).

Symmetry Mode

-- Click on the “Symmetry Mode” drop-down arrow and
 -- Select:

- Continuous
Symmetry measurements are carried out continuously
- Discharge
Symmetry measurements are only carried out when the battery bank is in discharge mode (AC mains is OFF).

Read also about [Symmetry Measurements during Discharge Mode](#) (page 304), in the [Functionality Description section](#).

Discharge Delay

Click on the “Discharge Delay” text box and type the number of minutes to delay the symmetry measurements after the discharge mode has begun. An 8 minutes delay should be suitable.

Alarm Limits (Event-Level-Alarm Group) section

- Click on the “Level” text boxes and type a high and a low alarm limit level (Delta voltage), e.g. “1.50” and “1.00”
- Click on the “Alarm Group” drop-down arrows and select an alarm group for each alarm limit level, to be activated when the level is eventually reached

You can configure two alarm limit levels (Delta voltage) to apply for all the “SymmDelta x.x” alarm monitors, and the Alarm Output Groups that will be activated when the alarm levels are eventually reached.

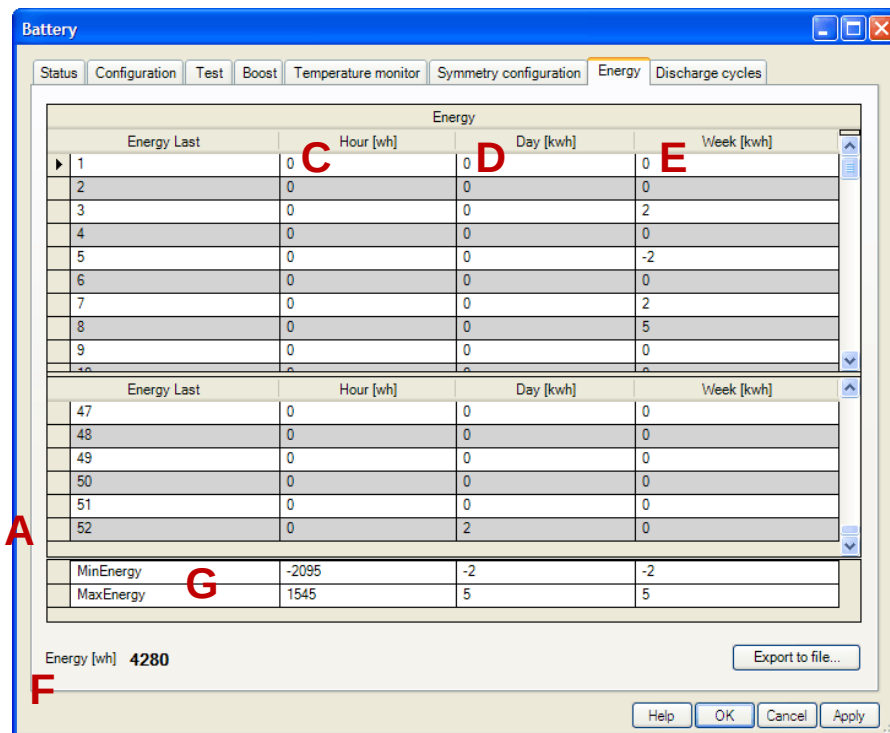
For instead, you can configure the 8 alarm monitors to generate alarms when the Delta voltage is 1.5V (Major Alarm) and 1.0V (Minor Alarm).

NOTICE: The “SymmDelta x.x” alarm monitors may also be configured individually by clicking on the monitors name in the “[Symmetry dialog box](#)” on page 130

Energy tab - Battery

This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**, and then clicking on the “Energy” tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of dialog box with the battery banks' Energy Log.

The "Energy" tab displays the "Energy Log" for the system's battery bank, thus logging the batteries' energy usage, (Wh).

The controller logs the **energy** that the battery bank has received or used (–) and has provided to the load (+) during the **last hour (C)**, during the **last day (D)** and during the **last week (E)**.

Also, the controller logs the **total (F)**, **minimum and maximum (G)** energy provided or used by the battery bank since the first system start-up.

NOTICE:

The Energy Log for the battery bank may display positive and negative values. Positive values represent energy provided by the battery to the load, while negative values represent energy used by the battery via recharging.

The system controller stores the latest 52 calculations (A), which can be displayed by the Energy Log.

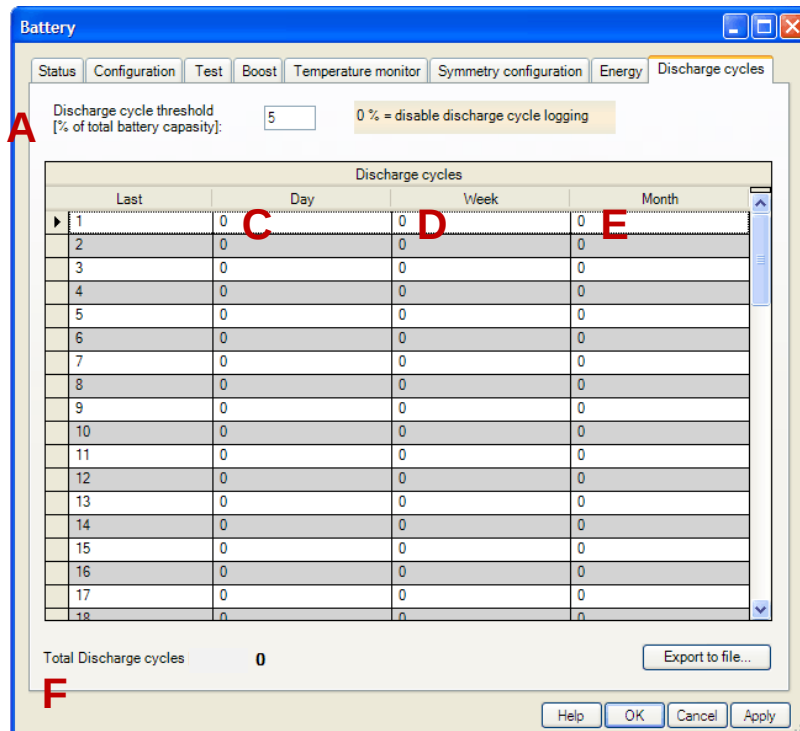
You find more graphical, detailed description in the "Energy Log" topic of [Measurement Logs](#) (page 232), in the [Functionality Description](#) section.

Clicking on the "Export to file" button, enables to save the Energy Log in XML format to a computer.

Discharge Cycles tab

This dialog box is displayed by double-clicking on the **Battery icon** in the **Power Explorer pane**, and then clicking on the "Discharge Cycles" tab.

The dialog box may display more tabs than shown in the example.



This figure shows an example of dialog box with the battery banks' Discharge Cycles Log.

This tab displays the “**Battery Discharge Cycles Log**” for the system’s battery bank, which is a **record of performed battery cycles**.

In general, every time a battery is charged and discharged, it uses one battery cycle.

The “**Discharge Cycle Threshold**” X% of full charge (A) is a hysteresis value for the controller to ignore small current variations from discharging to charging or vice versa.

The controller logs the number of performed battery cycles during the **last day** (C), during the **last week** (D) and during the **last month** (E).

Also, the controller logs the **total number of battery cycles** (F) performed since the first system start-up.

The system controller stores the latest 52 calculations, which can be displayed by the “Battery Discharge Cycles Log”.

Clicking on the “**Export to file**” button, enables to save the Discharge Cycles Log in XML format to a computer.

You find more graphical, detailed description in the “Battery Discharge Cycles Log” topic of [Measurement Logs](#) (page 232), in the [Functionality Description](#) section.

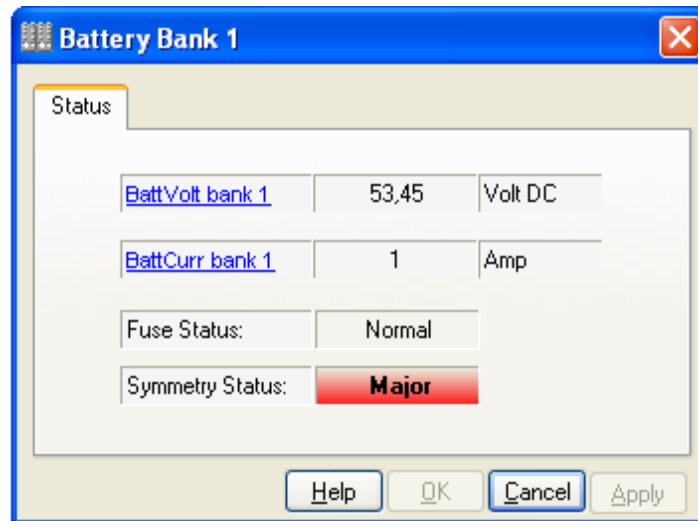
Battery Bank nn dialog box

This dialog box is displayed by double-clicking any of the **Battery Banks icons** in the **Power Explorer pane**.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to [“Access Levels”](#) on page 19.

Status tab



Read also about [Overview Battery Measurements](#) (page 295) and [Available Inputs and Outputs](#) (page 354), in the [Functionality Description](#) section.

This dialogue box displays the status of the battery bank 1 measurements:

- The bank's Voltage B1, measured by alarm monitor "BattVolt bank1"
- The bank's Current B1, measured by alarm monitor "BattCurr bank1"
- The status of the bank's Fuse B1
Status "Normal" means that the bank's fuse is not open nor tripped.
- The status of the bank's Symmetry monitors.
Status "Normal" means that none of the active symmetry monitors are in alarm.
Status "Major" or "Minor" is displayed when one or several of the symmetry monitors are in alarm.
Each of the 8 *Smartpack* controller's symmetry inputs may be monitored by a symmetry alarm monitor.
Refer to the [“Symmetry dialog box”](#) on page 130.

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

You can **click on** the "BattVolt bank1" and "BattCurr bank1" **alarm monitor links** to view or edit the monitors' parameters.

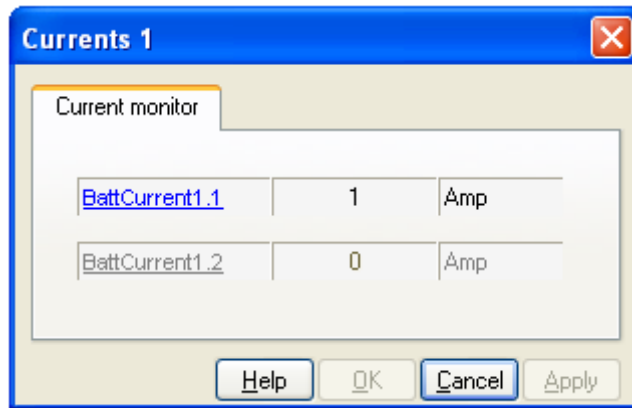
Read topic [“Alarm Monitor dialog boxes”](#) on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

Currents dialog box

This dialog box is displayed by double-clicking on the **Currents icon**, under the battery banks in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.
To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.



Read also about [Overview Battery Measurements](#) (page 295) and [Available Inputs and Outputs](#) (page 354), in the [Functionality Description](#) section.

This dialogue box displays the implemented battery string current measurements:

- The string's Current S1,
measured by alarm monitor "BattCurrent 1.1"

The battery bank's current – measured by "BattCurr bank1" alarm monitor and displayed in "[Status tab](#)" on page 127 – is the sum of all the implemented and active battery string current monitors.

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

You can **click on** the "BattCurr x.x" **alarm monitors links** to view or edit the monitor's parameters.

Read topic "[Alarm Monitor dialog boxes](#)" on page 163 about how to interact with alarm monitor dialogue boxes.

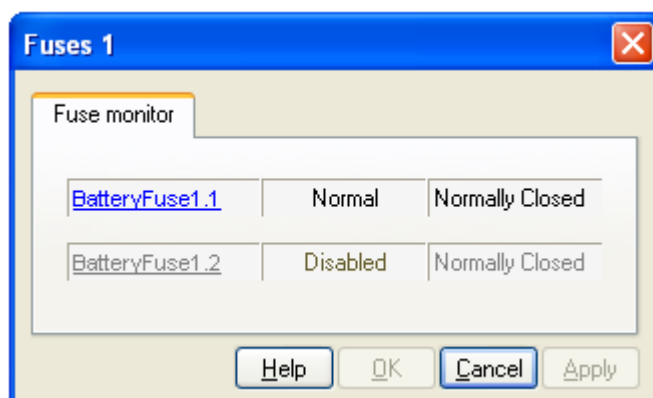
Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

Fuses dialog box

This dialog box is displayed by double-clicking on the **Fuses icon**, under the battery banks in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.



Read also about [Overview Battery Measurements](#) (page 295) and [Available Inputs and Outputs](#) (page 354), in the [Functionality Description](#) section.

This dialogue box displays the status of the battery string Fuse alarm monitor:

- The status of the string's Fuse S1
Status "Normal" means that the string's fuse is not open nor tripped.
Status "Major" or "Minor" is displayed when the string fuse is open or tripped, and the Fuse alarm monitor is in alarm.

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

You can **click on** the "BatteryFuse x.x" **alarm monitors links** to view or edit the monitor's parameters.

Read topic "[Alarm Monitor dialog boxes](#)" on page 163 about how to interact with alarm monitor dialogue boxes.

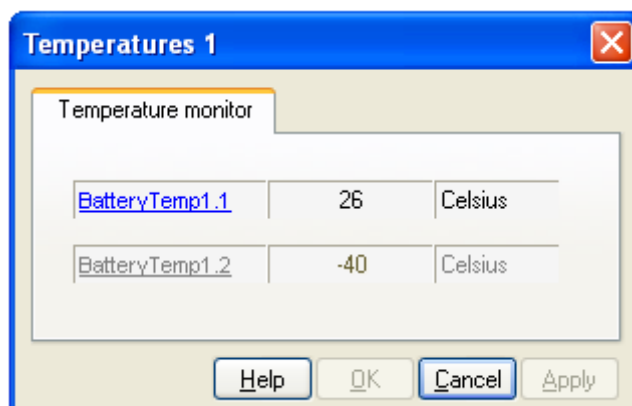
Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

Temperatures dialog box

This dialog box is displayed by double-clicking on the **Temperatures icon**, under the battery banks in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.



Read also about [Overview Battery Measurements](#) (page 295) and [Available Inputs and Outputs](#) (page 354), in the [Functionality Description](#) section.

This dialogue box displays the temperatures measured by the “BatteryTemp x.x” alarm monitor. Whether it is the battery string’s or battery bank’s temperature, depends on where the temperature sense probes are physically located.

NOTICE: The “BatteryTemp” alarm monitor -- in the Battery dialog box, on the “[Status tab](#)” on page 105 -- will display the highest temperature measured by either the “BatteryTemp 1.1” or “BatteryTemp 1.2” alarm monitors.

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

You can **click on** the “BatteryFuse x.x” **alarm monitors links** to view or edit the monitor’s parameters.

Read topic “[Alarm Monitor dialog boxes](#)” on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

Symmetry dialog box

If the power system’s controller is the *Smartpack*, then this dialog box is displayed by double-clicking on the **Symmetries icon**, under the battery banks in the **Power Explorer pane**.

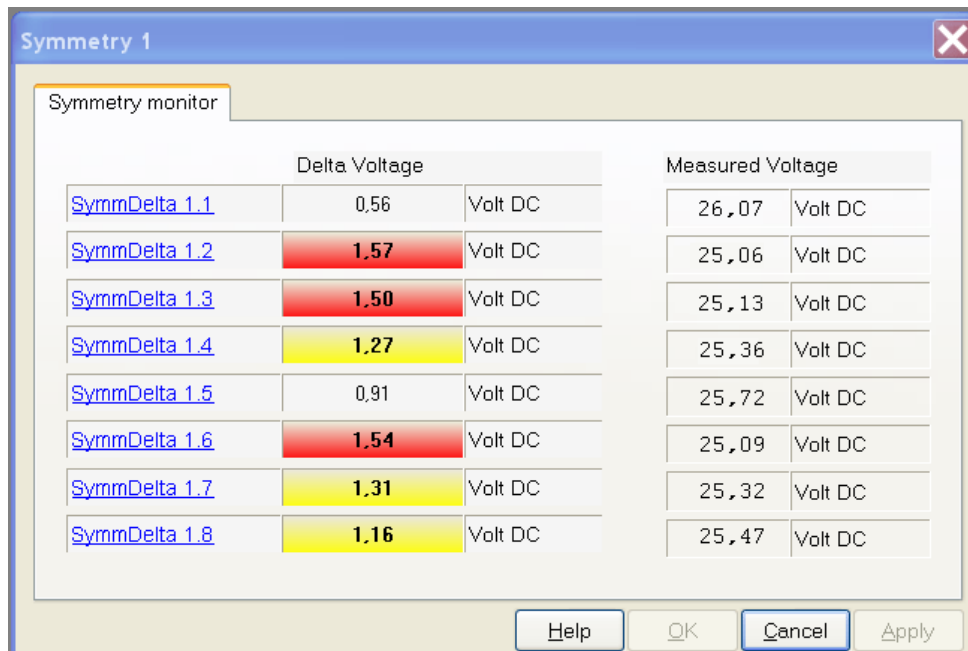
NOTICE:
When symmetry measurements are implemented with *internal* inputs (from the *Smartpack* controller) and *external* inputs (from connected Battery Monitor modules), then you must enable both internal and external symmetry measurements.
Then, read also topic “[Battery Monitor dialog box](#)” on page 132.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

In the [Functionality Description section](#), you can read more about:

- [Overview Battery Measurements](#) (page 295)
- [Battery Symmetry Measurements](#) (page 296)
- [Available Inputs and Outputs](#) (page 354)
- [The Battery Monitor Control Unit - Overview](#) (page 360)



This dialogue box displays the “SymmDelta x.x” alarm monitors’ status and voltages:

- The battery **Symmetry Status**
Red = Major Alarm
Yellow= Minor Alarm
White= Correct symmetry
- The measured **Symmetry Voltages**
- The calculated **Delta Voltages**

The dialogue box above shows 8 “SymmDelta x.x” alarm monitors used to monitor 8 battery strings using the mid-point measurement method (24V = 2x12V blocks).

The 8 “SymmDelta x.x” alarm monitors are configured to generate alarms when the Delta voltage is 1.5V (Major Alarm) and 1.0V (Minor Alarm).

Read more about [Battery Symmetry Calculations](#) (page 305), in the [Functionality Description](#) section.

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

You can **click on** the “SymmDelta x.x” **alarm monitors links** to view or edit the monitor’s parameters.

Read topic “[Alarm Monitor dialog boxes](#)” on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

NOTICE: In addition to individually activate the “SymmDelta x.x” alarm monitors, you have to Enable Symmetry generally for the power system, from the “[Symmetry Configuration tab](#)” on page 123.

Battery Monitor dialog box

If you have connected Battery Monitor modules to the CAN bus, then this dialog box is displayed by double-clicking on the **Battery Monitor icon** (BattMonStr.nn) in the **Power Explorer pane**, under the Battery group.

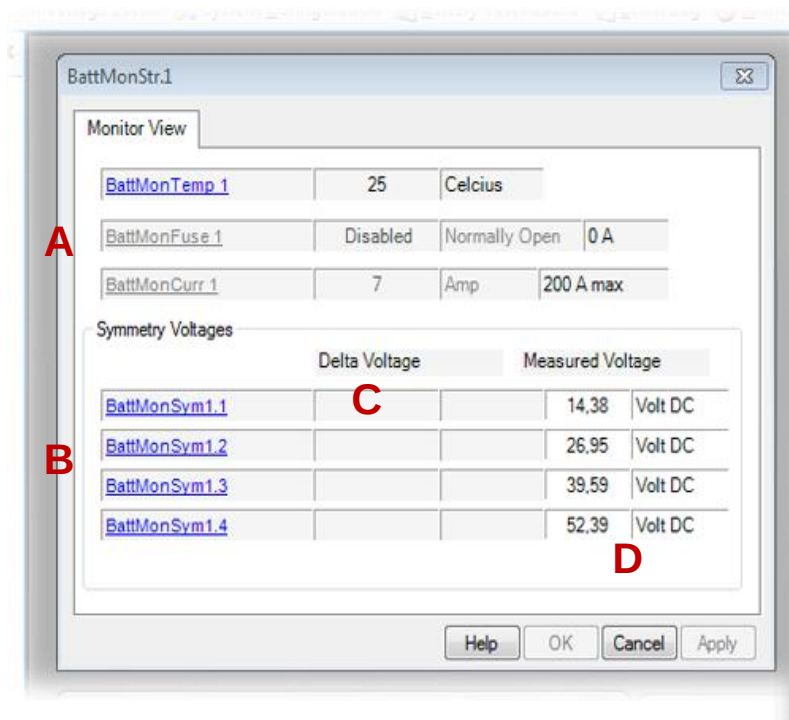
NOTICE:

When symmetry measurements are implemented with *internal* inputs (from the *Smartpack* controller) and *external* inputs (from connected Battery Monitor modules), then you must enable both internal and external symmetry measurements.

Then, read also topic “[Symmetry dialog box](#)” on page 130.

In the [Functionality Description section](#), you can read more about:

- [Overview Battery Measurements](#) (page 295)
- [Battery Symmetry Measurements](#) (page 296)
- [Available Inputs and Outputs](#) (page 354)
- [The Battery Monitor Control Unit - Overview](#) (page 360)



This dialogue box “BattMonStr X” displays the alarm monitors used by the Battery Monitor module:

- “BattMonTemp 1” (A)
monitors the Battery Monitor’s built-in temperature sensor
- “BattMonFuse 1” (A)
monitors a battery fuse via the Battery Monitor’s Battery Fuse input
- “BattMonCurr 1” (A)
monitors the system’s current shunt via the Battery Monitor’s Battery Current input

- “BattMonSym x.x” (B)
monitors the Battery Monitor’s four Battery Symmetry inputs, and displays the alarm monitors’ status and voltages:
 - The battery **Symmetry Status** (C)
(empty fields in this example)
Red = Major Alarm
Yellow= Minor Alarm
White= Correct symmetry
 - The measured **Symmetry Voltages** (D)
 - The calculated **Delta Voltages** (C)
(empty fields in this example)

The 4 “BattMonSym x.x” (B) alarm monitors are generally configured to generate alarms when the Delta voltage is 1.5V (Major Alarm) and 1.0V (Minor Alarm).

Read more about [Battery Symmetry Calculations](#) (page 305), in the [Functionality Description](#) section.

You can **click on** the **alarm monitors links** to view or edit the monitor’s parameters.

Read topic “[Alarm Monitor dialog boxes](#)” on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

NOTICE: In addition to individually activate the alarm monitors, you have to Enable Symmetry generally for the power system, from the “[Symmetry Configuration tab](#)” on page 123.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.
To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

String nn dialog box

When the *String View* is selected in the General tab, under “Tools > Options”, you can display this dialog box by double-clicking on the **String nn icon** in the **Power Explorer pane**.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.
To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Status tab

Click on the “**Status**” tab, to show its data.

Cell Monitor tab

Click on the “**Cell Monitor**” tab, to show its data.

Commissioning tab

Click on the “**Commissioning**” tab, to show its data.

String Monitor nn dialog box

When the *String View* is selected in the General tab, under “Tools > Options”, you can display this dialog box by double-clicking on the **String Monitor nn icon** in the **Power Explorer pane**.

For information about the pane’s colour codes and how expand or collapse the tree, read “[Power Explorer pane \(1\)](#)” on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to “[Access Levels](#)” on page 19.

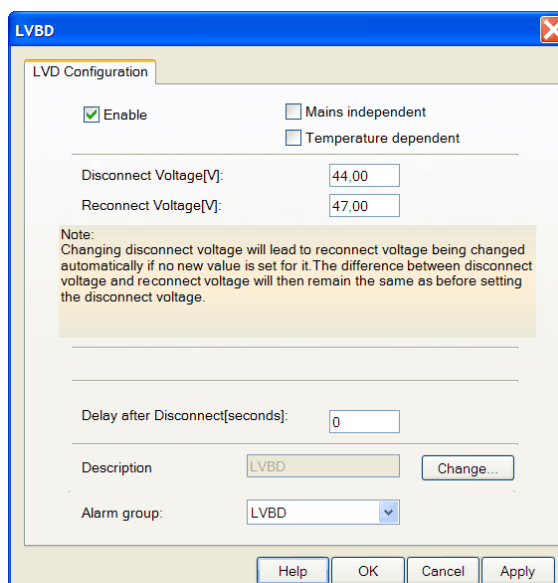
For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Sub-Dialog Boxes ~ Battery

These sub-dialogue boxes are displayed by clicking on buttons or links that you find in battery related dialogue boxes.

LVBD dialog box

This dialog box is displayed by clicking on the “**LVBD**” alarm monitor link, which you find in the **Battery dialog box**, on the “**Status**” tab.



This special alarm monitor dialog box enables you to configure the system’s LVBD contactor.

- **Select suitable parameters**
(click on the links below for a description)

- **Click on the Enable** box to activate the parameters (checked)
- **Click on the Apply button**, to save the changes

Read more about the topics [Alarm Monitors](#) (page 324) and [LVBD - Battery Protection](#) (page 320), in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<< [Back to the Battery dialog box, Status tab](#), page 105

Enable

Check this option to activate or enable the alarm monitor, so that it functions according to the entered parameters in the other fields.

Removing the check mark disables the alarm monitor, and it will not function, regardless of the data entered in the other fields.

Mains and Temperature Dependency

Mains Independent

Check this option if you want that the LVBD alarm monitor will reconnect the LVBD contactor when the rectifier system output voltage reaches the Reconnect Voltage limit, regardless whether Mains is ON or OFF. For example, this is possible using an additional primary supply.

Read more about the topic [LVBD - Battery Protection](#) (page 320), in the [Functionality Description](#) section.

Uncheck this option (Mains dependent) if you want that the LVBD alarm monitor will NOT reconnect the LVBD contactor until Mains is ON again.

Temperature Dependent

Check this option if you want that the LVBD alarm monitor will reconnect the LVBD contactor when the battery temperature is lower than the temperature limit configured in the “BatteryTemp” alarm monitor, that you find in the Battery dialog box, in the “[Status tab](#)” on page 105.

Disconnect and Reconnect Voltages

Use the keyboard to edit the alphanumeric field.

Disconnect Voltage

Enter a numeric value for the battery voltage drop-down limit. When -- after a Mains failure -- the battery voltage gradually drops down to this limit; then the alarm monitor raises the alarm and trips the LVBD contactor. Use the units indicated in the field.

Reconnect Voltage

Enter a numeric value for the battery voltage reconnection limit. When the Mains supply is ON again, the rectifier system output voltage increases to this limit; then the alarm monitor will reconnect the LVBD contactor. Use the units indicated in the field.

Delay after Disconnect

Enter the **Time delay or number of seconds** the LVBD contactor has to be tripped or disconnected, before the alarm monitor is allowed to reconnect the LVBD contactor.

Description

It is not advisable to change the name of this system alarm monitor.

Changing the description text is useful with logical alarm monitors, used with programmable inputs. But it is not advisable to change the description of other system alarm monitors.

If you must, click in the **Change** button and edit the text in the field.

Alarm Group

Use the drop-down list.

- Select the predefined Alarm Output Group that you want the alarm monitor to activate

Battery Table Data dialog box

This dialog box is displayed by clicking on the “**Edit Battery Table...**” button, which you find in the **Battery dialog box**, on the “**Configuration**” tab.

Select battery table: Battery table 1 [v] Get data

Battery Table

Description: Fiamm SLA100

High end volt[V/cell]: 1,90 (ref 1)

Low end volt [V/cell]: 1,75 (ref 2)

Minutes	Current ref1	Current ref2
1	222,0	392,0
5	184,0	300,0
10	151,0	216,0
15	127,0	169,0
20	110,0	141,0
30	89,0	106,0
47	69,0	87,7
60	56,1	63,3
90	40,7	45,5
120	31,9	36,0
180	22,8	26,3
240	18,1	20,9
300	15,2	17,5
480	10,2	12,2
600	8,4	10,1

Add row

Delete row

Import from file...

Export to file...

Help OK Cancel Apply

Use this dialogue box to select, edit, export and import battery tables.

Read more about [Battery Tables](#) (page 308), in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

[<<< Back to the Battery dialog box, Configuration tab, page 107](#)

Selecting a Battery Table

Do following to select a battery table:

1. Display the table's data by,
 - Clicking on the "**Select Battery Table**" drop-down arrow,
 - then selecting one of the tables in the menu,
 - and clicking on the "**Get Data**" button**OR**

Import a previously saved battery table from the PC by,

 - Clicking on the "**Import from File**" button.

Read "[Editing a Battery Table](#)" on page 137, if you need to change the table.
2. Click on the "**Apply**" button,
to upload the data to the controller
3. Click on the "**OK**" button,
to close the "Battery Table Data" dialogue box and return to the "Battery" dialogue box
4. Click on the "Tools" menu, and select the command "Refresh", or press the "F5" key,
to update the data displayed in the "Battery" dialog box

Editing a Battery Table

If you have selected an editable battery table from the drop-down list, or imported the table from a file on the PC, you can change the table's name, end-of-discharge voltage values and the discharge performance data.

You can find the discharge performance data for a certain battery type, by reading the manufacturer's battery data sheet.

Do following to change a displayed battery table:

1. Enter a name for the battery table by,
 - Clicking on the "**Description**" text field, and
 - Typing a name that describes your edited table
2. Enter the two end-of-discharge voltage values by,
 - Clicking, one at a time, on the "**High End Volt**" and "**Low End Volt**" text fields, and
 - Typing the two voltage values
3. Change any of the **table's values** by,
 - Clicking on the actual cells, and
 - Editing the parameters**TIPS:**
 - You can jump forward between cells by pressing TAB, and backwards by pressing SHIFT+TAB
 - You can insert or remove rows at the end of the table by clicking on the "Add Row" or "Delete Row" button respectively
4. Click on the "**Apply**" button,
to upload the data to the controller

- Click on the “**OK**” button, to close the “Battery Table Data” dialogue box and return to the “Battery” dialogue box
- Click on the “Tools” menu, and select the command “Refresh”, or press the “**F5**” key, to update the data displayed in the “Battery” dialog box

Exporting a Battery Table

If you have selected a battery table from the drop-down list, or imported it from a file, and then edited the table’s parameters, you can save a backup copy of the edited table to a file on the PC.

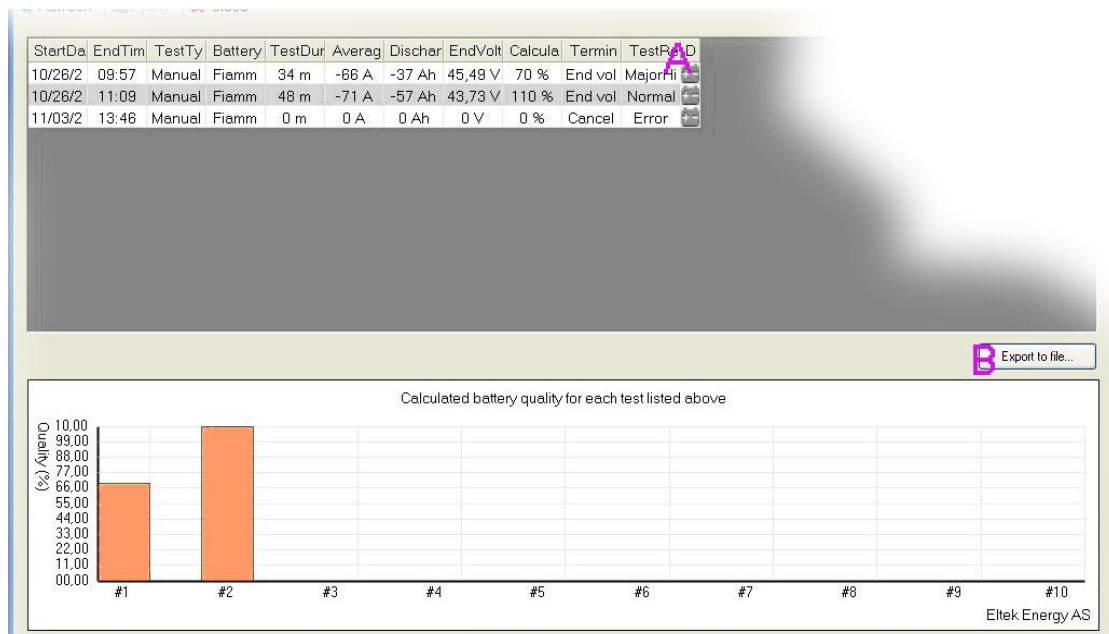
Do following to save the table to a file on the PC:

- Click the “**Export to File**” button to export the Battery Table to a file in your computer.
- Select a folder** in your PC and type a **file name**, to save the battery table to

Battery Test Results dialog box

This dialog box is displayed by clicking on the “**View Test Results...**” button, which you find in the **Battery dialog box**, on the “**Test**” tab.

Due to the usefulness of the test results, it can also be displayed clicking on the “**Battery Test Results**” button on [The Toolbar](#), page 26.



The dialogue box displays result table; each row of data represents a battery test. Also, the battery quality, calculated by completed battery tests, is displayed in the lower bar graph.

You can do the following with the battery test results:

- Click on the “**Export to File**” button (B) to save the battery test results to an XLM file in your computer, e.g. <The Battery Test Results.xlm>

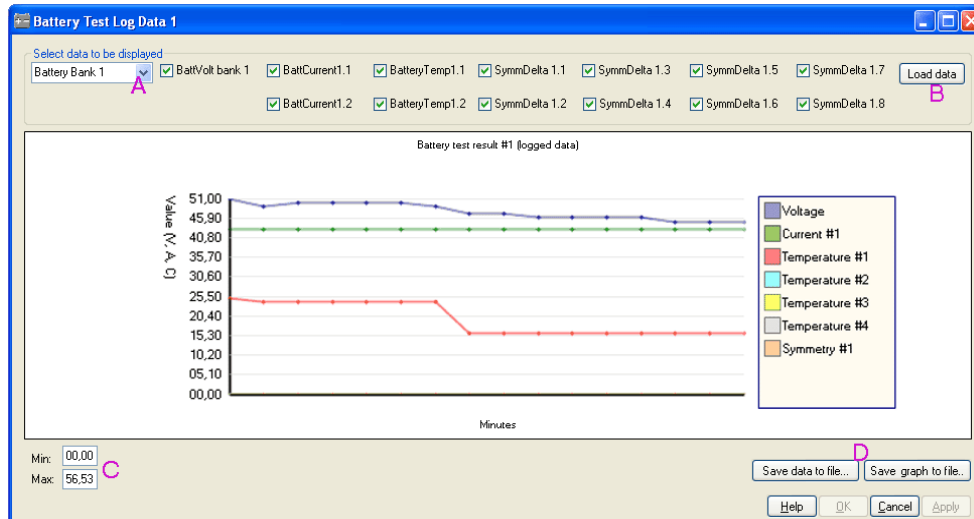
OR

- Click on one of the test's Details buttons (A), on the table's “**Details**” column, to open the “[Battery Test Log Data dialog box](#)” on page 139, where you can observe more detailed data for each battery test.

<<< [Back to the Battery dialog box, Test tab, page 110](#)

Battery Test Log Data dialog box

This dialog box is displayed by clicking on the Details icon, on the table's “**Details**” column, on the “[Battery Test Results dialog box](#)” on page 138



The dialogue box displays the test results for a battery test in a line graph.

You can do the following with the battery test results:

- Click on the “**Select Data to be Displayed**” drop-down arrow (A) and select the battery bank that you want to see test results for.
- Click on the data check boxes (checked) to enable the battery test **data types** to display in the line graph. Click again to (unchecked) to disable the data types you do not want to display.
- Click on the “**Min**” and “**Max**” text fields (C) and type the minimum and maximum values to display on the line graph's Y axis.
- Click on the “**Load Data**” button (B), to display the selected types of data on the line graph

AND

- Click on the “**Save Data to File**” or “**Save Graph to File**” buttons (D) to respectively
 - Save the battery test results data to an XLM file in your computer, e.g. <Battery Test Log Data 1_1.xlm>
 - or
 - Save the battery test results graph to an JPG file in your computer, e.g. <Battery Test Log Data 1_1.jpg>

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the Battery dialog box, Test tab, page 110](#)

Voltage Calibration dialog box

This dialog box is displayed by **right-clicking on the Battery Voltage alarm monitor link** – that you find in the Battery dialog box, on the Status tab – and selecting the **Calibrate** command.

Current Shunt Scaling dialog box

This dialog box is displayed by **right-clicking on the Battery Current alarm monitor link** – that you find in the “Currents mn” dialog box, on the Current Monitor tab – and selecting the **Scale** command.

Control System

Following dialog boxes are used to interact with DC power supply system, and configure it with parameters related to the system's controller and other control system units.

Control System dialog box

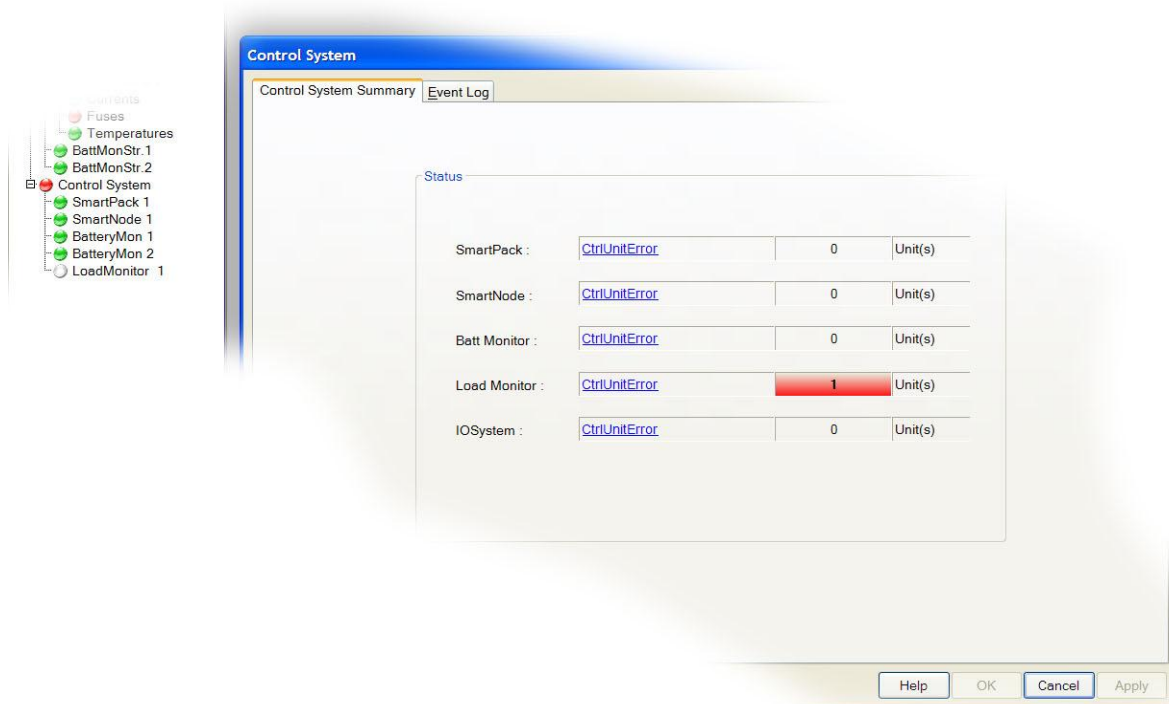
This dialog box is displayed by double-clicking on the **Control System icon** in the **Power Explorer pane**.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

Control System Summary tab

Click on the "**Control System Summary**" tab, to show its data.



This dialogue box presents the status of all the connected system controllers and other control units.

The "CtrlUnitError" alarm monitors supervise whether the control units have internal, hardware or communication errors.

- **"0 Unit(s)"**
means that all the connected control units of this type are functioning correctly
- **"1 Unit(s)" (red coded)**
means that 1 (or the number of malfunctioning units) of the connected control units of this type (e.g. Load Monitors) is not working correctly
- The Power Explorer pane displays malfunctioning control units with a **red Control System icon** and **gray Control Unit icon(s)**

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

You can **click on** the “CtrlUnitError” **alarm monitors links** to view or edit the monitor’s parameters.

Read topic “[Alarm Monitor dialog boxes](#)” on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

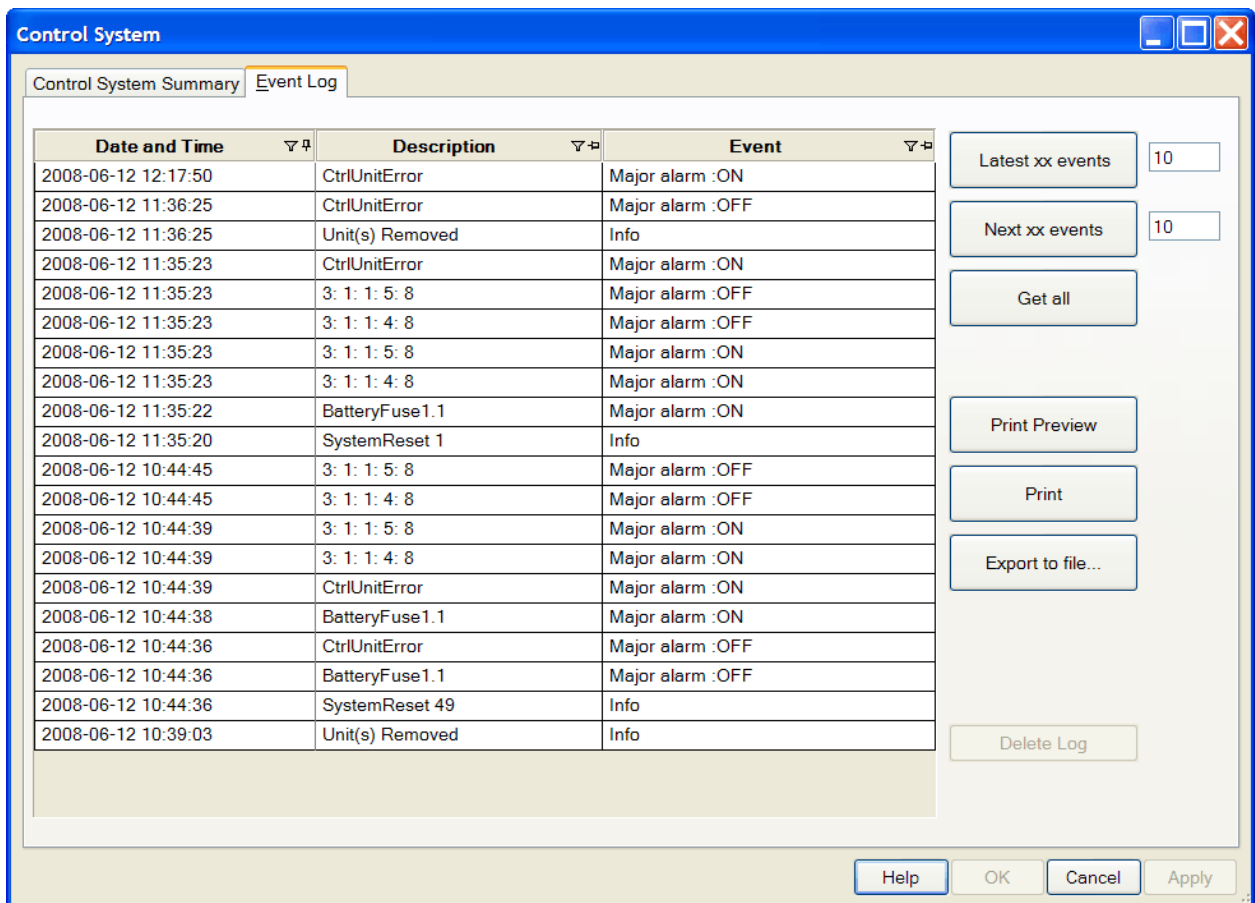
Control System Event Log tab

Click on the “**Event Log**” tab, to show its data.

Due to the usefulness of the event log, you may also display it by clicking on the “**Event Log**” button on [The Toolbar](#), page 26.

This dialog box presents, in user friendly ways, a log of system related events stored in the system’s control unit(s). Also, it enables you to delete, print and save the log to a file in your computer.

Read more about “events” in the topic [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).



Click on the links below for a description.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Read more in topic Type of Logs in PowerSuite (page **Error! Bookmark not defined.**) on the FAQs section.

NOTICE: Please contact your closest *Eltek* representative or service engineer if you want to delete the event log. ("Delete Log" button)

Getting the Event Log

You can import the event log stored in the system control units, as follows:

- Click in the text field to the right of the "Latest xx events" button, and **edit the number of the latest events** you want to display
- Click on the "**Latest xx events**" button, to display the events

AND display more by

- Clicking in the text field to the right of the "Next xx events" button, and **edit the number of the next latest events** you want to add to the already displayed events
- Clicking on the "**Next xx events**" button, to add these events to the already displayed ones

OR display all by

- Clicking on the "**Get all**" button, to display all events stored in the system control units

Sorting and Displaying the Event Log

You can sort and move the columns of the imported event log, as follows:

- **To sort the log** alphabetically or chronologically,
-- **Click on the column title** you want to sort,
e.g. on the "Date and Time" column title, to sort the log chronologically.

-- **Click again** on the same column title **to reverse the sort order.**

NOTICE: A gray sorting triangle icon on the column title bar indicates that the column is sorted in that order.

- **To move the columns,**
-- **Click on the column's horizontal pin icon** that you want to move:
The pin icon turns to **point downwards**, indicating that the column can be moved.
E.g. on the "Date and Time" horizontal pin icon.

-- Point at the **column title and drag it to the side** you want to move the column. Red arrows indicate the column position you can move the column to.
E.g. drag the "Date and Time" column title to the right.

NOTICE: The columns at the sides can easily be moved to the centre position by just clicking on the pin icon.

Filtering the Event Log

You can filter the imported event log, as follows:

Generic Filtering

- **To filter the log** (only display events with certain criteria),
-- **Click on the column's funnel icon**, and, in the drop down list, select the **criteria for the events** you want to filter, e.g. on the "Date and Time" column, select a date to display only the events registered that date, or select "Major alarm: ON" in the "Event" column to display only these events.

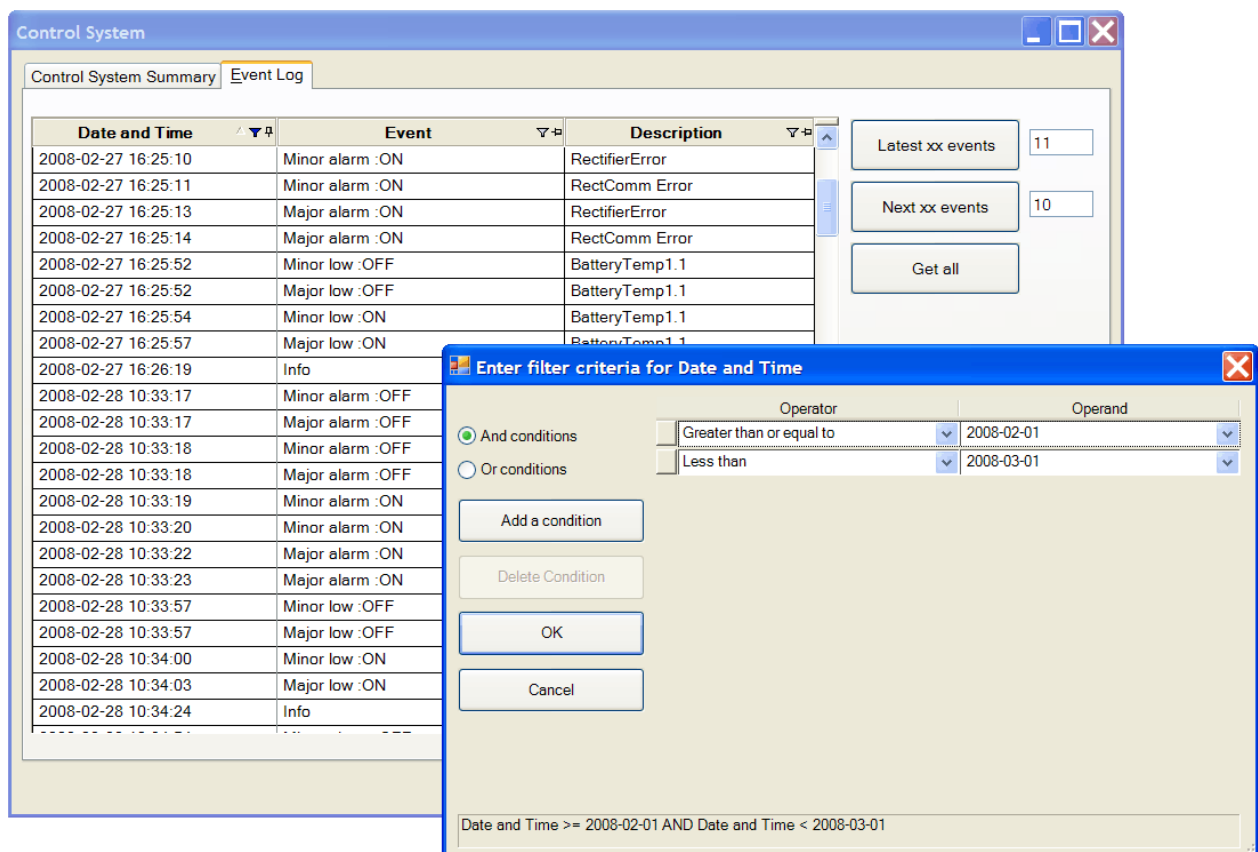
-- **Click on the column's funnel icon**, and, in the drop down list, select **"(All)"** to **remove the filter criteria** and display all the events again.

NOTICE: A blue funnel icon on the column title bar indicates that the column is filtered (not all events are listed). A grey funnel icon indicates that no filter selection is made (all events are listed)

Customized Filtering

You can customize how to filter the log (only display events with customized criteria).

For example, do the following to show only the events occurred on February 2008.



- **Click on the column's funnel icon** of the "Date and Time" column, and -- in the drop down list -- select **"(Custom)"** to **create your own filter criteria**
- In the dialog box "Enter filter criteria for Date and Time"
-- Select **"Greater than or equal to"** operator
-- Click in the operand text field and edit or **type a date 2008-02-01** (keep the format yyyy-mm-dd)

- Click on the **“Add a condition” button**, to display a new condition text fields
- Select **“Less than”** operator
- Click in the operand text field and edit or **type a date 2008-03-01** (keep the format yyyy-mm-dd)
- Check the **“And conditions”**
- Click the **“OK”** button

Another example of customized filtering could be selecting “Major alarm: ON” in the “Event” column to display only these events.

Printing Out the Event Log

You can print out the imported event log, as follows:

- **Click on the “Print Preview” button**, to open a Print Preview window, where you can:
 - **Navigate to specific pages** to analyze details of the event log report, before you print it out on paper.
Click on the Page text field and type the page number.
 - **Zoom in and out** for detailed analysis.
Click on the arrow by the magnifying glass, and select the zoom percentage.
 - **Print out** the event log on paper.
Click on the printer icon.
- OR
- **Click on the “Print” button**; to print out the event log directly, without a preview

WARNING: It is advisable to print out using the “Print Preview” button, thus avoiding printing out long reports inadvertently on e.g. 56 sheets of paper.

Exporting the Event Log to a File

You can save in your computer an XML file containing the displayed event log.

- Click the **“Export to file...” button**, (if required) and in the dialog box **type the name** you want to give to the file you want to export to,
Do not change the type of file in the “Save as type” field. The type must be XML.

Control Unit nn dialog box

All control units are displayed in similar dialog boxes, which you open by **clicking on the actual control unit's name**, under the Control System group in the **Power Explorer** pane.

The Power Explorer pane will **only display the control units that are correctly connected** to the control system.

In addition to the *Summary* tab, the dialog box will **display the tabs necessary for configuring** the actual control unit.

The number of displayed tabs will vary, depending on the control unit's functionality, (e.g. some will have a Communication tab, while others will display an Outdoor tab).

Read more about [CAN bus Addressing](#) (page 345), in the [Functionality Description](#) section.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.

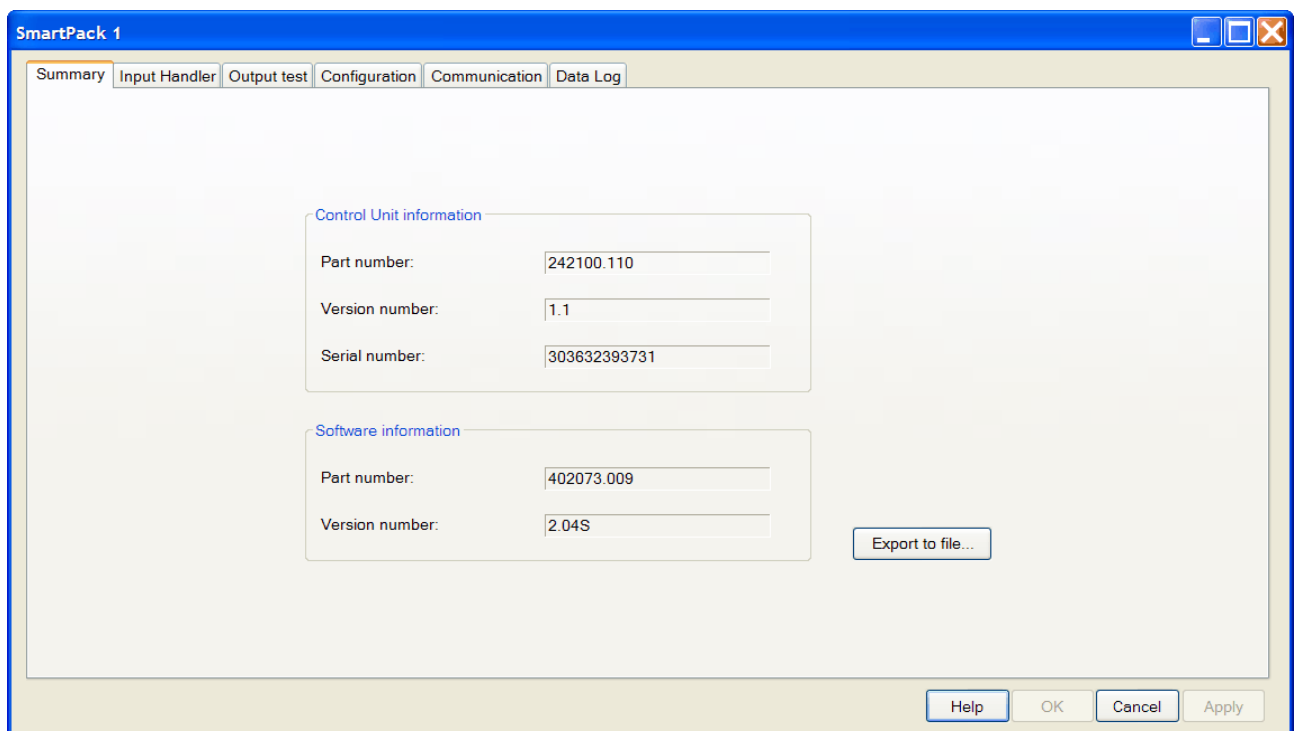
To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.

Click on one of the dialog box's tabs to configure the control unit's parameters.

Control Unit Summary tab

Click on the "**Summary**" tab, to show its data.

All control units will display the "**Summary**" tab.



The displayed data on the Summary tab is not editable.

<<< [Back to the "Control Unit nn dialog box" on page 146.](#)

Control Unit information

This area displays the control unit's **part number**, **version number** and **serial number**.

Read more about "[CAN bus Addressing](#) (page 345)" and "[Plug-and-Play Rectifiers](#) (page 278)", in the [Functionality Description](#) section.

Software information

This area displays the **part number** and **version number** of the software (**firmware**) installed in the control unit.

Export to File button

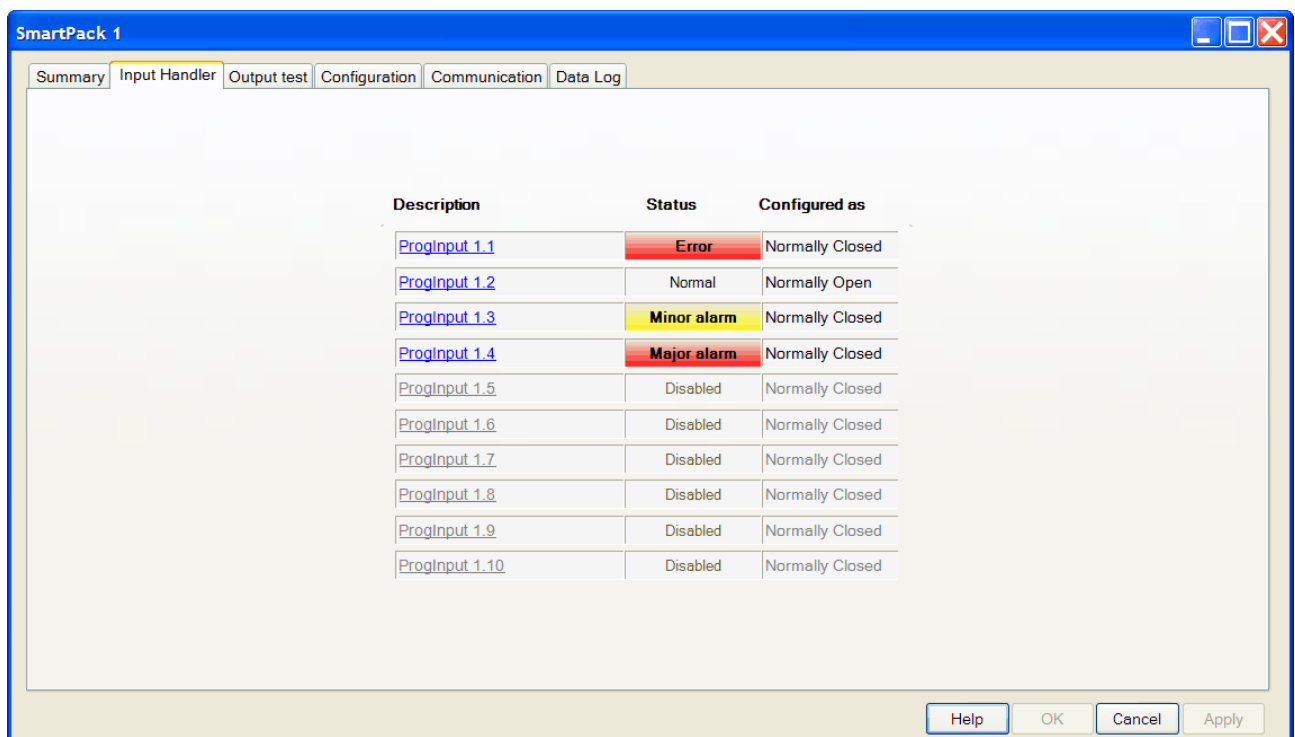
You can save in your computer an XML file containing the displayed data summary.

- Click the "**Export to file...**" button, (if required) and in the dialog box **type the name** you want to give to the file you want to export to, Do not change the type of file in the "Save as type" field. The type must be XML.

Control Unit Input Handler tab

Click on the "**Input Handler**" tab, to show its data.

Only the control units that implement programmable inputs (e.g. *Smartpack* and *Compact* controllers, I/O Monitor) will display the "**Input Handler**" tab.



Click on the links to configure the alarm monitors.

Find more information in the "[Alarm Monitor dialog boxes](#)" on page 163, or in the tutorial "[How to Configure Alarm Monitors & Programmable Inputs](#)", page 176.

Right-click on the links and select “**Configure**”, to set the input’s activation pattern.

Each row in the *Input Handler* tab displays **one alarm monitor**, which, when active, monitors and controls one of the control unit’s programmable inputs.

The first column (**Description**) shows the **alarm monitors’ names** as links. Each link is assigned to one of the control unit’s programmable inputs. A **blue link** represents that the alarm monitor for the actual programmable input is **enabled**, while grey links represent disabled (not-activated) alarm monitors.

For example: the greyed “*ProgInput 1.5*” link indicates that the alarm monitor assigned to programmable input #5, connected to *Smartpack* #1, is disabled.

The second column (**Status**) represents the **monitor’s status**:

- **Disabled**
the alarm monitor is not software enabled in *PowerSuite*
- **Normal**
the monitored programmable input is in normal state.
The contacts connected to the input are open, and the input is configured as “Normally Open”, or closed and the input is configured as “Normally Closed”). See also “[Alarm Monitor Configuration tab](#)” on page 169.
- **(Alarm)**
the monitored programmable input is NOT in normal state.
When in alarm state, this column displays the selectable event configured in the alarm monitor (e.g. “Error”, “Major Alarm”, etc.)

The third column (**Configured as**) displays in what position -- **closed or open** -- the **external relay contacts** connected to the inputs **must be**, when the input is in normal state. See also “[Alarm Monitor Configuration tab](#)” on page 169.

<<< [Back to the “Control Unit nn dialog box”](#) on page 146.

Control Unit Output Test tab

Click on the “**Output Test**” tab, to show its data.

Only the control units that implement alarm relay outputs (e.g. *Smartpack* and *Compact* controllers, I/O Monitor) will display the “**Output Test**” tab.

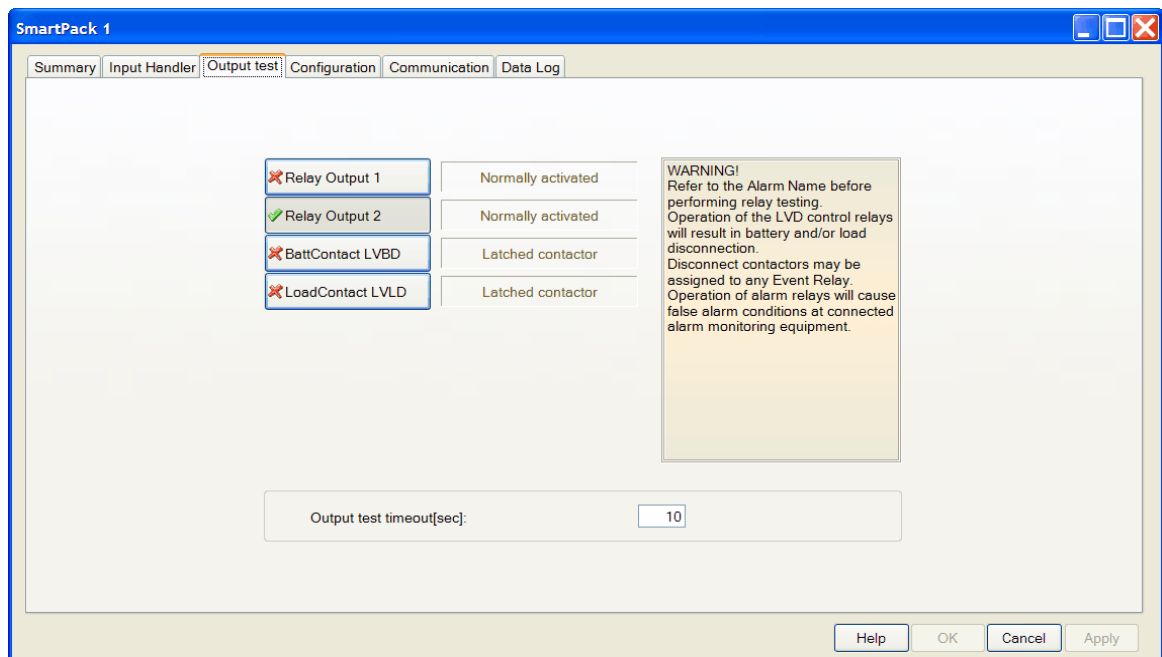
The Output Test functionality enables to **test and verify the circuits** connecting external equipment to the power system’s alarm relay outputs.

The Output Test button will toggle the alarm relay contacts -- regardless of the position they are at the moment -- for the period of time entered in the “Output Test Timeout (sec)” text field.

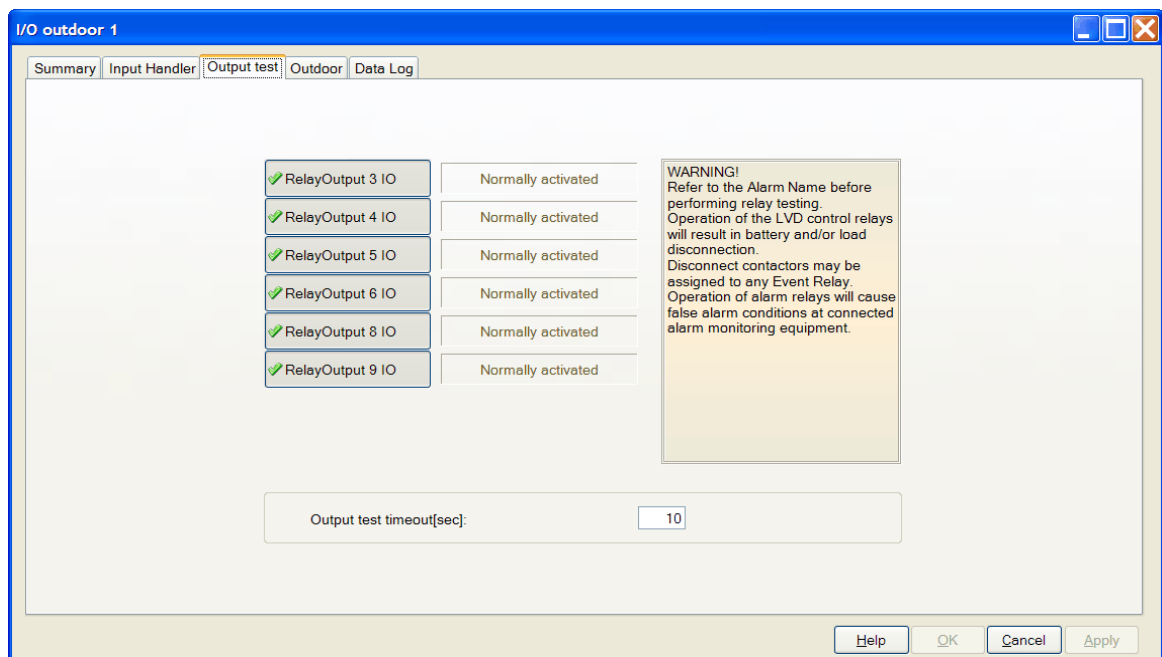
NOTICE: Testing the LVBD contactor will disconnect the batteries from the load (no battery backup). Testing the LVLD contactor will disconnect the power supply from non-priority loads.

Only perform this test, when it is acceptable to temporally loose the battery backup, or when it is acceptable that non-priority loads temporally shut down.

See also “[Alarms Overview Outputs tab](#)” on page 59.



This dialog box displays the **buttons for testing the relay outputs** implemented in a *Smartpack controller* (Two relays outputs, the LVBD battery contactor and the LVLD load contactor).



This dialog box displays the **buttons for testing the relay outputs** implemented in an **I/O Monitor** (Six relays outputs).

To test (toggle) one of the alarm relay outputs (temporarily change of position), carry out the following:

- Click on “Output Test Timeout (sec)” text field, and **type the number of seconds** you want the relay contacts to be in the opposite position (contacts toggled).
The relay contacts will automatically toggle back to their original position, after this period of time.

- **Click on the button** for the alarm relay that you want to test. The relay contacts (and the icon in the button) will toggle.
- **Click again on the same button** to stop the test. The relay contacts will toggle back to their original position. Otherwise, the relay contacts will automatically toggle back to their original position, after the entered period of time (timeout).

Each button displays the alarm relay name (or description you may have given the relay, see “[Editing the Alarm Output’s Name and Operation](#)” on page 62).

The **green icons** in the buttons indicate that the alarm relay contacts are in normal state. The **red icons** indicate that the alarm relay contacts are in alarm state. The LVBD and LVLVD contactor icons do not follow this rule, and it is indifferent which icon is displayed in the buttons.

The column at the buttons’ right side indicates **how the relay output is configured** (e.g. normally activated). See also “[Editing the Alarm Output’s Name and Operation](#)” on page 62.

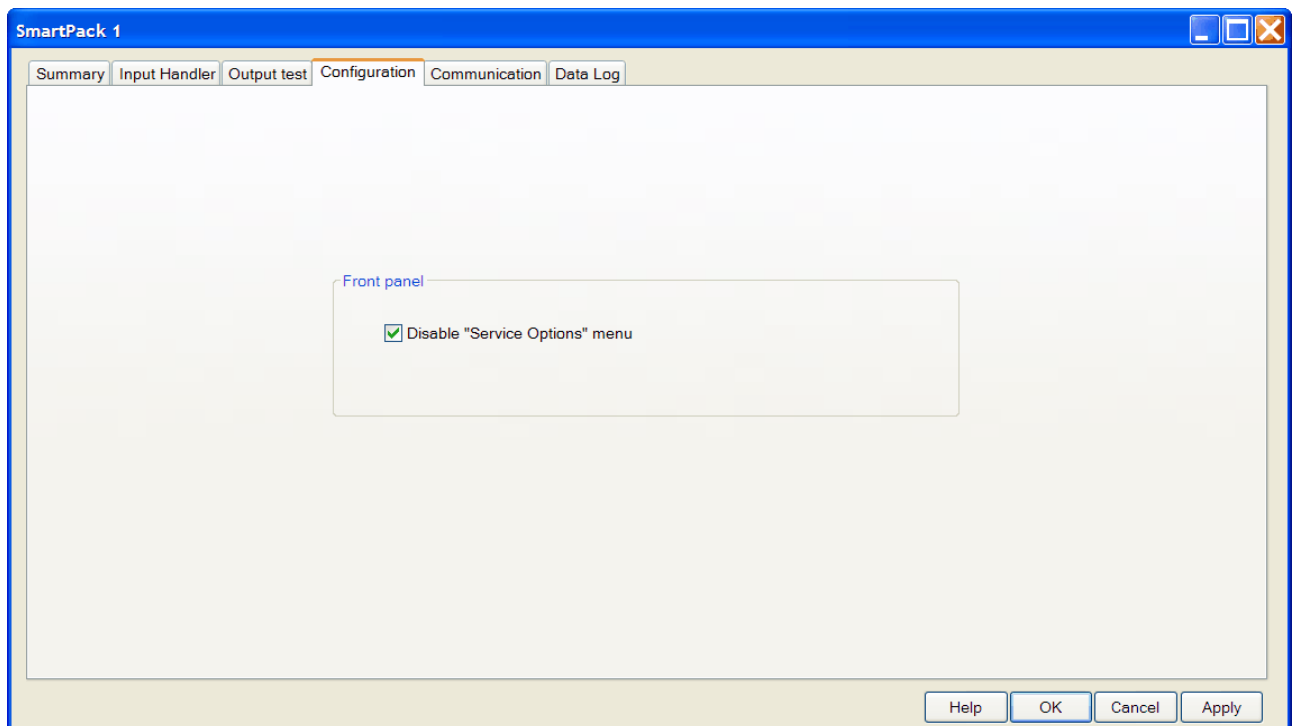
Read more about [System Inputs and Outputs - Overview](#) (page 349), in the [Functionality Description](#) section.

<<< [Back to the “Control Unit nn dialog box” on page 146.](#)

Control Unit Configuration tab

Click on the “**Configuration**” tab, to show its data.

Only the *Smartpack* and the *Smartpack2 Master* controller will display the “**Configuration**” tab.



- Click on the “Disable ‘Service Options’ menu” check box (checked) to **hide the Service Option menus on the controller’s display**. Only the User Option menus will be displayed on the controller.
- Click again on the “Disable ‘Service Options’ menu” check box (unchecked) to **show again the Service Option menus on the controller’s display**.

Note that the *PowerSuite* Login Levels are not affected by this function.

<<< [Back to the “Control Unit nn dialog box” on page 146.](#)

Control Unit Communication tab

Click on the “**Communication**” tab, to show its data.

Only the control units that implement USB, RS232, RS485 or similar communication ports (e.g. *Smartpack* controller, *Smartnode*) will display the “**Communication**” tab.

NOTICE: Please contact your closest *Eltek* representative or service engineer if you need to configure the control unit’s communication parameters (Factory Access Level).

Communication Port

- **COM0**
 - On Smartpack: USB communication port
 - On Smartnode: RS485 Serial communication port
- **COM1**
 - On Smartpack: RS232 Serial communication port on the controller’s front or rear panels
 - On Smartnode: RS232 Serial communication port
- **(COM2)**
 - On Smartnode: spare communication port (not mounted)

Protocol

- **pComm**
Eltek proprietary protocol developed for system communication with external equipment, e.g. computers, external control units, etc.
- **Modbus**
Protocol developed for system communication via the RS485 port.
- **CallBack**
Eltek proprietary protocol developed for system communication via the RS232 port with 3rd party modems.
- **Comli**
A telecom operator specific communication protocol.
- **RDP**
A customer specific communication protocol.

Speed, Data & Stop Bits, Parity

Accept the default values for speed (bits per second), data bits, stop bits and parity. If you have to change the default suggestions, ensure correct communication values are entered.

Address

Entering data in this field is required when selecting the Modbus protocol, otherwise the value is indifferent.

Enter a unique address for each connected Modbus control unit or node.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the “Control Unit nn dialog box”](#) on page 146.

Control Unit Data Log tab

Click on the “**Data Log**” tab, to show its data.

Only some control units (e.g. *Smartpack* and *Compack* controllers, I/O Monitor) will display the “**Data Log**” tab.

A Data Log is a log of key system data registered by the system controllers, or by other connected control units (e.g. I/O Monitor, Mains Monitor) at the intervals specified by *PowerSuite*.

The system data registered by the controller consists of voltages, current and temperature values. The I/O Monitor registers fan speed and temperature values.

The dialog box presents, in user friendly ways, a log of control unit related system data stored in the control unit(s). Also, it enables you to delete, print and save the log to a file in your computer.

SmartPack 1

Summary Input Handler Output test Configuration Communication **Data Log**

Timestamp	BatteryVol (Volt DC)	BatteryCure (Amp)	LoadCurrent (Amp)	RectifierCurr (Amp)	MainsVolt 1 (Volt AC)	BatteryTemp (Celsius)	BatteryTemp (Celsius)
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	237	0	-40	-40
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	237	0	-40	-40
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	237	0	-40	-40
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	237	0	-40	-40
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	237	0	-40	-40
2008-06-25 49.01	-200	200	0	238	0	-40	-40
2008-06-25 49.01	-200	200	0	237	0	-40	-40

Latest xx logs: 15
Next xx logs: 100
Get all
Print Preview
Print
Export to file...
Delete log...
Log interval
Interval[minutes]: 30
Critical interval [minutes]: 10
Help OK Cancel Apply

This dialog box displays a **Data Log** registered in the *Smartpack* controller.

I/O outdoor 1

Summary Input Handler Output test Outdoor **Data Log**

Timestamp	OutDoorTemp81. (Celsius)	OutDoorTemp81.2 (Celsius)	Fan speed 81.1 (%)	Fan speed 81.2 (%)
2008-06-25 20:26	-39	-39	0	0
2008-06-25 19:56	-39	-39	0	0
2008-06-25 19:27	-39	-39	0	0
2008-06-25 18:57	-39	-39	0	0
2008-06-25 18:27	-39	-39	0	0
2008-06-25 17:57	-39	-39	0	0
2008-06-25 17:27	-39	-39	0	0
2008-06-25 16:57	-39	-39	0	0
2008-06-25 16:27	-39	-39	0	0
2008-06-25 15:58	-39	-39	0	0

Latest xx logs: 10
Next xx logs: 100
Get all
Print Preview
Print
Export to file...
Log interval
Interval[minutes]: 30
Critical interval [minutes]: 10
Help OK Cancel Apply

This dialog box displays a **Data Log** registered in the *I/O Monitor*.

To select how often the control unit will log the key system data, carry out the following:

- **Select the Log interval**, by clicking on the **Interval** text field, and typing how often (the number of minutes) the control unit will log the key system data, while the system is NOT in a critical condition
AND
clicking on the **Critical Interval** text field, and typing how often (the number of minutes) the control unit will log the key system data, while the system is in a critical condition

Read more about [Power System's Operation Mode](#) (page 242), in the

Functionality Description section

- **Click on the Apply button**, to save the changes

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Read more in topic Type of Logs in PowerSuite on the FAQs section.

NOTICE: Please contact your closest *Eltek* representative or service engineer if you want to delete the event log. (“Delete Log” button)

<<< [Back to the “Control Unit nn dialog box” on page 146.](#)

Click on the links below for a description.

Getting the Data Log

You can import the data log stored in the system control units, as follows:

- Click in the text field to the right of the “Latest xx events” button, and **edit the number of the latest events** you want to display
- Click on the **“Latest xx events” button**, to display the events

AND display more by

- Clicking in the text field to the right of the “Next xx events” button, and **edit the number of the next latest events** you want to add to the already displayed events
- Clicking on the **“Next xx events” button**, to add these events to the already displayed ones

OR display all by

- Clicking on the **“Get all” button**, to display all events stored in the system control units

Sorting and Displaying the Data Log

You can sort and move the columns of the imported data log, as follows:

- **To sort the log** alphabetically or chronologically,
-- **Click on the column title** you want to sort,
e.g. on the “Timestamp” column title, to sort the log chronologically.

-- **Click again** on the same column title **to reverse the sort order.**

NOTICE: A gray sorting triangle icon on the column title bar indicates that the column is sorted in that order.

- **To move the columns,**
-- Point at the **column title and drag it to the side** you want to move the column. Red arrows indicate the column position you can move the column to.
E.g. drag the “Timestamp” column title to the right.

Printing Out the Data Log

You can print out the imported data log, as follows:

- **Click on the “Print Preview” button**, to open a Print Preview window, where you can:
 - **Navigate to specific pages** to analyze details of the data log report, before you print it out on paper.
Click on the Page text field and type the page number.
 - **Zoom in and out** for detailed analysis.
Click on the arrow by the magnifying glass, and select the zoom percentage.
 - **Print out** the event log on paper.
Click on the printer icon.

OR

- **Click on the “Print” button**; to print out the data log directly, without a preview

WARNING: It is advisable to print out using the “Print Preview” button, thus avoiding printing out long reports inadvertently on e.g. 56 sheets of paper.

Exporting the Data Log to a File

You can save in your computer an XML file containing the displayed data log.

- Click the **“Export to file...” button**, (if required) and in the dialog box **type the name** you want to give to the file you want to export to,
Do not change the type of file in the “Save as type” field. The type must be XML.

Control Unit Modem Callback Setup tab

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the “Control Unit nn dialog box” on page 146.](#)

Control Unit Outdoor tab

Click on the “**Outdoor**” tab (B), to show its data.

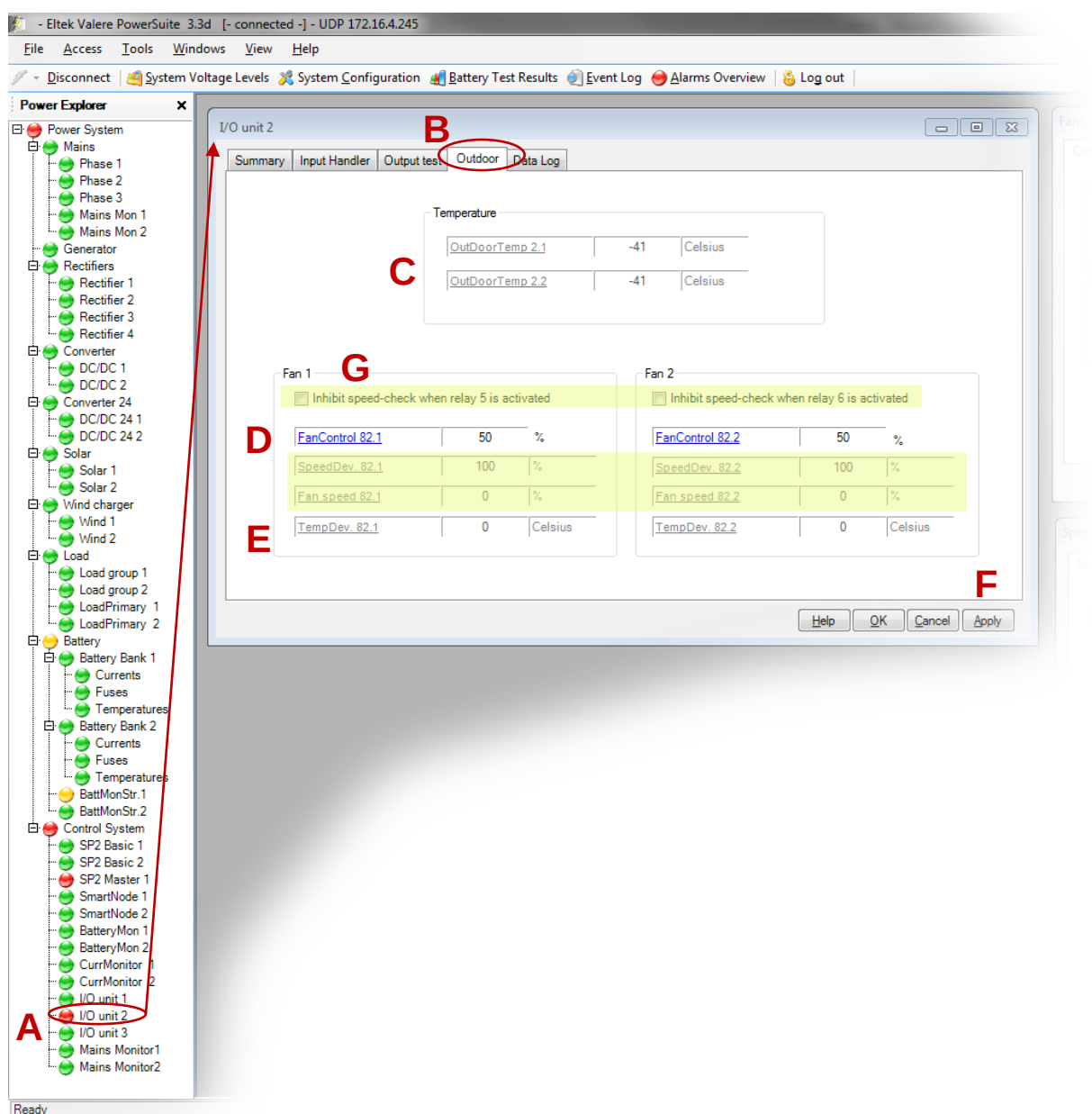
If the “I/O Unit X” dialog box is not displayed, click on the I/O unit name, e.g. I/O Unit 1 (A).

Only I/O Monitor CAN nodes type T1 and T3 will display the “**Outdoor**” tab.

Climate Control Signals ~ I/O Monitor (T1 and T3)

Both the *I/O Monitor* (T1) and *I/O Monitor3* (T3) CAN bus nodes are equipped with input and output signals to monitor and control the fan speed and compartment temperature inside fan-cooled outdoor cabinets.

Read more in topics [The I/O Monitor Control Unit \(T1\) - Overview](#) (page 361), and the [Climate Control Functions - Outdoor Cabinets](#) (page 249), in the [Functionality Description](#) section



For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

You can **click on** the **alarm monitors links** to view or edit the monitor's parameters.

Read topic "[Alarm Monitor dialog boxes](#)" on page 163 about how to interact with alarm monitor dialogue boxes.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

When the configuration is completed, click on **Apply** button (F) and the **OK** button to activate the changes.

NOTICE:

The grayed fields in the dialog box above are not displayed at Service Access Level.

Please contact your closest *Eltek* representative or service engineer if you need to configure these fields' parameters (Factory Access Level).

<<< [Back to the "Control Unit nn dialog box"](#) on page 146.

Temperature Sense dialog box (C) (E)

The two inputs "**Temperature Sense X.1**" and "**Temperature Sense X.2**" are designed to be used with the AD590 series of temperature sensors, e.g. to monitor the temperature inside and outside of fan-cooled outdoor cabinets.

In the "I/O Unit X" dialog box, in the Outdoor tab, the alarm monitors "**OutDoorTemp X.Y**" (C) are used to control these two Temperature Sense inputs, which measure the cabinet's internal temperature ($T_{Int}^{\circ C}$) and external temperature ($T_{Ext}^{\circ C}$).

The alarm monitor "**TempDev X.Y**" (E) compares the deviation between the internal temperature source ($T_{Int}^{\circ C}$) and the external temperature source ($T_{Ext}^{\circ C}$).

If the deviation ($\pm T_D^{\circ C}$) is higher than the entered alarm limit ($T_{Lim}^{\circ C}$), an alarm is generated.

$$[(T_{Ext}^{\circ C} - T_{Int}^{\circ C}) = T_D^{\circ C} \\ T_D^{\circ C} > T_{Lim}^{\circ C} \quad \text{alarm}]$$

Fan Speed Control and Monitoring – PWM (D) (G)

Fan Speed Control – PWM

The two inputs "**Tachometer Input 1**" and "**Tachometer Input 2**" are developed to monitor the rotational speed of two individual fans. The fan speed is displayed as a percentage of the maximum speed. In order to convert the signal frequency on the tachometer inputs to the correct percentage speed, the inputs must be configured with the number of pulses per revolution (ppr) and with the maximum fan speed (rpm).

The two outputs “**Speed Control Output 1**” and “**Speed Control Output 2**” are designed as Pulse-Width-Modulation (PWM) outputs, to individually control the speed of two independent fans. The outputs can be configured to give a linear control signal from 0V (0% fan speed) to 10V (100% fan speed).

The configuration and calibration of the installed fans is entered in the “I/O Unit X” dialog box, in the Outdoor tab, using the *PowerSuite*’s alarm monitors “**FanControl X.Y**” (for the fan speed control output), and in alarm monitor “**FanSpeed X.Y**” (for the speed monitoring input) (D).

Alarm monitor “**SpeedDev X.Y**” (Factory Access Level only) compares the deviation between the theoretical fan speed ($V_{Th}\%$, outputted by “FanControl X.Y” and displayed in the Outdoor tab) with the real fan speed ($V_R\%$, monitored by “FanSpeed X.Y”).

If the deviation ($\pm V_D\%$) is higher than the entered speed limit ($V_{Lim}\%$), the *I/O Monitor* generates an alarm.

$$(V_{Th}\% - V_R\%) = V_D\% \quad V_D\% > V_{Lim}\% \rightarrow \text{alarm}$$

Fan Speed Control – ON/OFF

The *I/O Monitor*’s relay outputs 5 and 6 have higher contacts rating, and are suitable for fan control and other current demanding equipment. For example, they can be used for driving external control relays for switching the fans ON/OFF, instead of using the PWM Speed Control Outputs.

The fan is then either turned ON ($V=100\%$) or turned OFF ($V=0\%$).

Checking ☒ “**Inhibit speed-check...**” check box (G), enables to easily deactivate the fan speed monitoring when the fans are controlled by relay outputs 5 and 6, instead of the PWM outputs.

Control Unit Earth Fault tab

Click on the “**Earth Fault**” tab (B), to show its data.

If the “SP2 Basic X” dialog box is not displayed, click on control unit name, e.g. SP2 Basic 1 (A).

Only the control units that implement Earth Fault Detection (e.g. *Smartpack2 Basic* controllers) will display the “**Earth Fault**” tab.

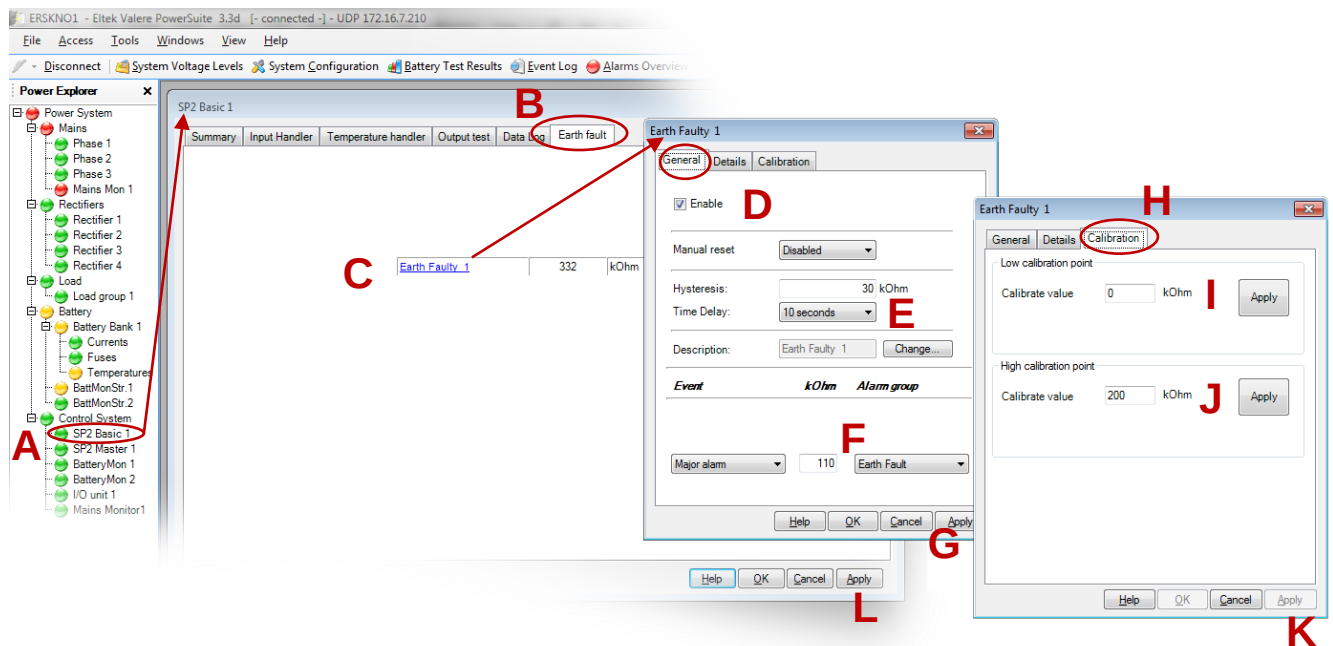
WARNING:

To be able to use the Earth Fault Detection functionality, the power system must be implemented with “floating earth”, which means that “Telecom Earth” (TE) or DC Earth must NOT be connected to the power system’s DC output rail (+ or –).

Read more in topic [Earth Fault Detection](#) (page 244), in the [Functionality Description section](#)

The Earth Fault Detection functionality requires no external wiring, and you must enable it to use, as it is deactivated by default.

Read more about [Earth Fault Detection](#) (page 244), in the [Functionality Description section](#)



Click on the link “Earth Faulty X” (C) to configure the alarm monitor that controls the Earth Fault Detection functionality.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Right-click on the link (C) and select “Calibrate”, to display directly the alarm monitor’s Calibration tab (H), and enter the calibration parameters (I) (J).

The “Earth Faulty X” link (C) displays the **Earth Fault Detection alarm monitor**, which, when active, monitors and controls the controller’s Earth Fault Detection function.

The first column shows the **alarm monitors’ name** as a link, e.g. “Earth Faulty 1”. A **blue link** represents that the alarm monitor is **enabled**, while a grey link represents a disabled (not-activated) alarm monitor.

The second column displays the **monitor’s actual measurement** (332 kOhm), and also shows the monitor’s **status**:

- **Normal**
White background colour indicates that the *ground-to-supply conductor impedance* is higher than the configured limit (R_{Limit}), e.g. 110 k Ω (F)
- **Alarm**
Red background colour indicates that the *ground-to-supply conductor impedance* is lower than the configured limit (R_{Limit}), e.g. 110 k Ω (F).

Trigger Level – Earth Fault Detection

Clicking on the link “Earth Faulty X” (C) opens the alarm monitor dialog box, where you can:

- Enable the monitor (D)
- Configure how to reset the monitor, its hysteresis and time delay (E), and give the monitor a descriptive name

- Enter the trigger level (**F**), or the minimum ground-to-supply conductor impedance allowed before the monitor raises an earth fault alarm. E.g. $R_{Limit} = 110 \text{ k}\Omega$
- Select which alarm output group (relays) the monitor will activate (**F**)
- Click on the **Apply button** (**G**), after making all the selections.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Calibration – Earth Fault Detection

Clicking on the “Calibration” tab (**H**) you can enter the selected values to calibrate the Earth Fault Detection function:

- Calibrate the function’s **Low Calibration Point** by:
 - For example, making a short circuit between ground chassis and the system’s Common DC Output Rail, then
 - Enter “0” k Ω in the Calibrate value field (**I**)
 - Click in the **Apply button** (**K**)
 - Remove the short circuit
- Calibrate the function’s **High Calibration Point** by:
 - For example, connecting a 200 k Ω resistor between ground chassis and the system’s Common DC Output Rail,
 - Then, Enter “200” k Ω in the Calibrate value field (**J**)
 - Click in the **Apply button** (**K**)
 - Remove the resistor
- Click on the OK button, in the alarm monitor dialog box, then click on the **Apply button** (**L**), after making all the selections.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

Read more about [Earth Fault Detection](#) (page 244) and about [System Calibration](#) (page 218) in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the “Control Unit nn dialog box”](#) on page 146.

Control Unit Temperature Handler tab

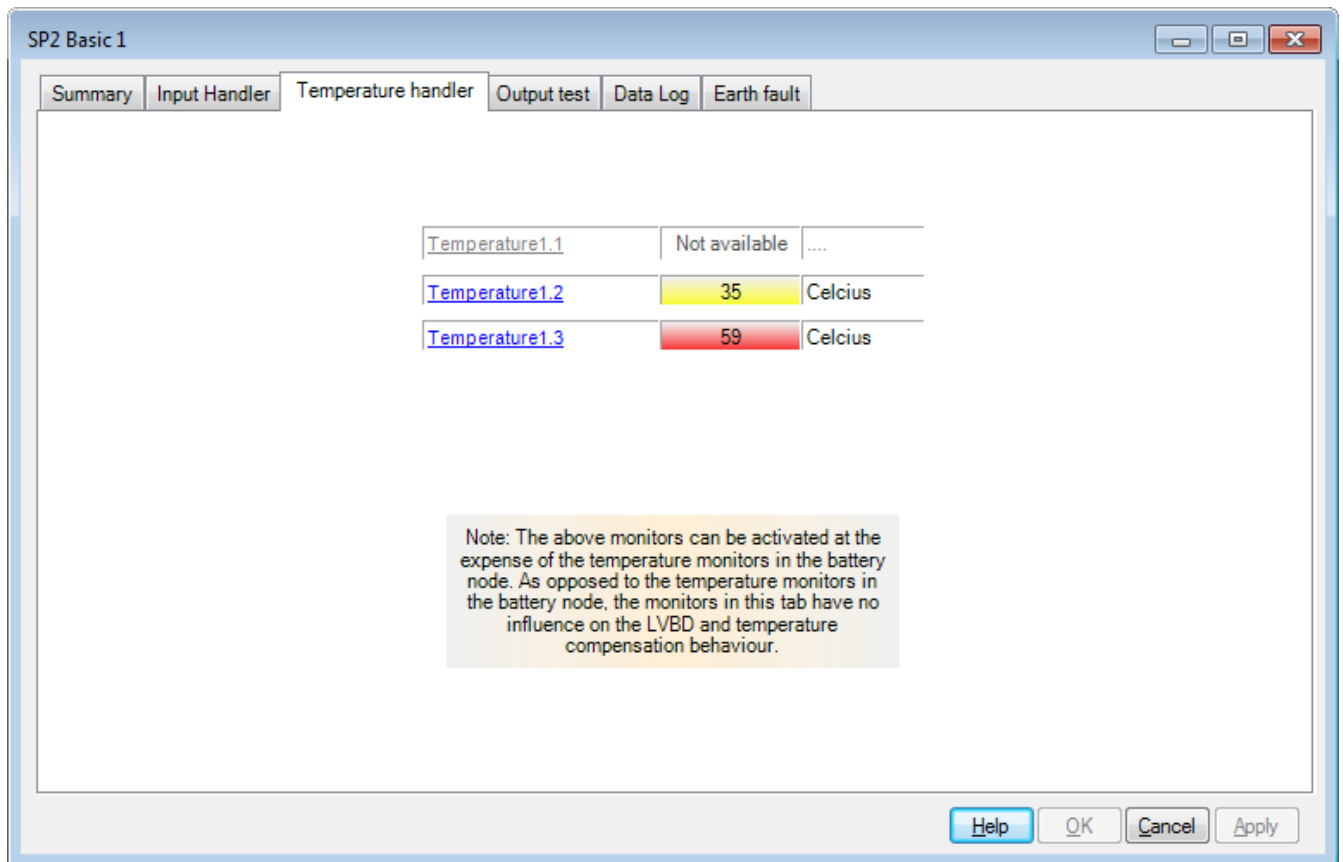
Click on the “**Temperature Handler**” tab, to show its data.

If the “SP2 Basic X” dialog box is not displayed, click on control unit name, e.g. SP2 Basic 1, in the Power Explorer pane.

Only the control units that implement temperature sense inputs (e.g. *Smartpack2 Basic* controllers) will display the “**Temperature Handler**” tab.

Read also about [Overview Battery Measurements](#) (page 295) and [Available Inputs and Outputs](#) (page 354), in the [Functionality Description](#) section.

For information about the pane's colour codes and how expand or collapse the tree, read "[Power Explorer pane \(1\)](#)" on page 15.
To be able to change parameters in dialogue boxes, you have to log in; refer to "[Access Levels](#)" on page 19.



This dialogue box displays the temperatures measured by the “Temperature X.X” alarm monitors. Whether it is the battery string’s or battery bank’s temperature or other temperatures depends on where the temperature sense probes are physically located.

Click on the “**Temperature X.X**” alarm monitors to enable and edit the monitor’s parameters.

The first column shows the **alarm monitors’ name** as a link, e.g. “Temperature X.X”. A **blue link** represents that the alarm monitor is **enabled**, while a grey link represents a disabled (not-activated) alarm monitor.

The second column displays the **monitor’s actual measurement** (35 °C), and also shows the monitor’s **status**:

- **Normal**
White background colour indicates that the measured temperature is within the configured limit
- **Fault**
Yellow background colours indicate that measured temperature is outside the configured fault limit
- **Alarm**
Red background colours indicate that measured temperature is outside the configured alarm limit

The Apply and OK buttons are disabled because the dialogue box only displays non-editable parameters.

Find more generic information in topic the “[Alarm Monitor dialog boxes](#)” on page 163.

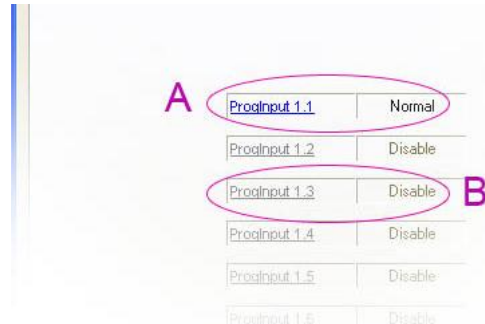
Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

<<< [Back to the “Control Unit nn dialog box”](#) on page 146.

Alarm Monitor dialog boxes

In this topic, you find how to interact with the alarm monitor dialogue boxes. For an overview of available alarm monitors and events, read topic “[Alarms Overview dialog box](#)” on page 55.

All alarm monitors are displayed in similar dialog boxes, which you open by **clicking on the alarm monitor’s name (underlined links)**. You find these links (alarm monitor’s names) in any other standard dialog boxes or panes.



Example of a dialog box with **an active alarm monitor (A)** and **disabled alarm monitors (B)**, all with underlined links. You can open the alarm monitors’ dialog boxes by clicking on the links.

The main difference between the alarm monitor dialog boxes is the number of Events or limits the alarm monitor compares the measured input signal with.

Also -- in addition to the *General* and *Details* tabs -- some special alarm monitor dialog boxes have tabs for **Scaling**, **Calibration**, **Configuration**, **Fan Speed**, **Earth Fault**, etc., which contain addition commands required for the specific alarm monitors.

Note that there are **two different types of Scaling tabs**: one used when **scaling fuses** in alarm monitor used for fuse monitoring, the other used when **scaling current shunts** in alarm monitor used for current measurements.

You can also **right-click on these special alarm monitor names** to select the *Scaling*, *Calibration* and or *Configuration* commands, which will open the dialogue box showing the respective tab.

Examples of special tabs in the Alarm Monitor dialog boxes:

- **Configuration tab**
The “ProgInput X.X” is an example of an alarm monitor with the *Configuration* tab; see “[Alarm Monitor Configuration tab](#)” on page 169.
- **Scaling and Configuration tab**
The “LoadFuse X” is an example of an alarm monitor with both the *Scaling* and the *Configuration* tab; see “[Alarm Monitor Configuration tab](#)” on page 169 and “[Alarm Monitor Scale tab \(fuses\)](#)” on page 172.
- **Scaling and Calibration tab**
The “BatteryCurrentX” is an example of an alarm monitor with both the *Scaling* and the *Calibration* tab; see “[Alarm Monitor Scale tab \(current shunt\)](#)” on page 171 and “[Alarm Monitor Calibration tab](#)” on page 167.
- **Calibration tab**
The “BatteryVoltage” is an example of an alarm monitor with the *Calibration* tab; see the Battery dialog box, on the “[Status tab](#)” on page 105.
- **Earth Fault tab**
The “Earth FaultyX” is an example of an alarm monitor with the *Earth Fault* tab, see the Control Unit nn dialog box, on “[Control Unit Earth Fault tab](#)” on

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

Alarm Monitor General tab

Click on the “**General**” tab, to show its data.

The **BatteryVoltage** dialog box has three tabs: **General**, **Details**, and **Calibration**. The **General** tab is active. It features a **Enable** checkbox (checked), a **Manual reset** dropdown (Disabled), a **Hysteresis** input (0.10 Volt DC), a **Time Delay** dropdown (3 seconds), and a **Description** field (BatteryVoltage) with a **Change...** button. Below these is a table for **Event** and **Alarm group** settings:

Event	Volt DC	Alarm group
Major high	57,00	Battery high
Minor high	56,80	Minor alarm
Minor low	47,00	Minor alarm
Major low	46,30	Battery low

Buttons at the bottom: **Help**, **OK**, **Cancel**, **Apply**.

Analog Alarm Monitor

Example (above) of dialog box of the *BatteryVoltage* alarm monitor, monitoring four Events or limits.

The **MainsLow** dialog box has two tabs: **General** and **Details**. The **General** tab is active. It features a **Enable** checkbox (checked), a **Manual reset** dropdown (Disabled), a **Hysteresis** input (0 Unit(s)), a **Time Delay** dropdown (0 seconds), and a **Description** field (MainsLow) with a **Change...** button. Below these is a table for **Event** and **Alarm group** settings:

Event	Unit(s)	Alarm group
Major alarm	2	Mains alarm
Minor alarm	1	Mains alarm

Buttons at the bottom: **Help**, **OK**, **Cancel**, **Apply**.

Numeric Alarm Monitor

Examples (above) of dialog box of the *MainsLow* alarm monitor, monitoring two Events or limits.

The **ProgInput 1.1** dialog box has three tabs: **General**, **Details**, and **Configuration**. The **General** tab is active. It features a **Enable** checkbox (checked), a **Manual reset** dropdown (Disabled), a **Hysteresis** input (0), a **Time Delay** dropdown (0 seconds), and a **Description** field (ProgInput 1.1) with a **Change...** button. Below these is a table for **Event** and **Alarm group** settings:

Event	Alarm group
Battery current limit	Generator AOG

Buttons at the bottom: **Help**, **OK**, **Cancel**, **Apply**.

Logical Alarm Monitor

This example (above) shows a dialog box of the *ProgInput 1.1* alarm monitor, which monitors only one Event or limit.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the “Alarm Monitor dialog boxes” on page 163.](#)

Enable

Check this option to activate or enable the alarm monitor, so that it functions according to the entered parameters in the other fields.

Removing the check mark disables the alarm monitor, and it will not function, regardless of the data entered in the other fields.

Manual Reset

Use the drop-down list and select whether the alarm generated by monitor can be *reset manually*, or automatically (when the event that caused the alarm is no longer true).

Click on the drop-down arrow, and select one of the following options:

- **Disable**
The monitor's alarm is only reset automatically
- **All levels**
The monitor's alarm generated by any of the assigned events must be reset manually
- **MajorHigh only**
The monitor's alarm generated by the *MajorHigh* event must be reset manually. It is reset automatically, when the alarm is generated by the other assigned events

Hysteresis and Time Delay

Use the keyboard to edit the alphanumeric field.

Hysteresis

Enter the **hysteresis (lag or delay in response)** of the values or limits, before the alarm monitor raises the alarm. Use the units indicated in the field.

Time delay

Enter the **Time delay or number of minutes** the input signal has to be over or under the limit.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

Description

You can change the description text of an alarm monitor by clicking in the Change button and editing the text in the field.

This is useful with logical alarm monitors, used with programmable inputs. But it is not advisable to change the description of other system alarm monitors.

Event, Values and Alarm Groups

Depending on the types of alarm monitors, you can select the event that trigger them, the limits or values and the alarm output groups the alarm monitor will activate.

In analogue and numeric alarm monitors

Use the keyboard to edit the alphanumeric field, and use the drop-down list.

- For each event, **enter the actual limits** or values in the middle fields, to the right of the Event fields.
- For each event, **select the predefined Alarm Output Group** that you want the alarm monitor to activate
- Click on the **Apply button**

In logical alarm monitors

Use the keyboard to edit the alphanumeric field, and use the drop-down list.

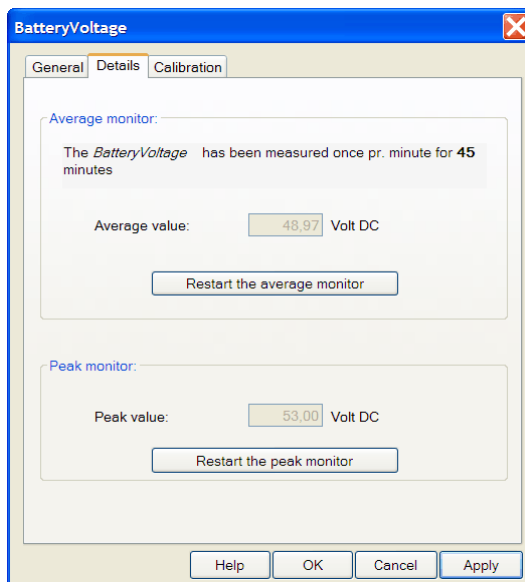
- **Select the predefined event** that you want the alarm monitor to activate when the input signal is not in the normal state
- **Select the predefined Alarm Output Group** that you want the alarm monitor to activate
- Click on the **Apply button**

Usually, analogue and numeric alarm monitors are defined from factory with the type of *events* used by the monitors; you only define the monitor's values or limits and the Alarm Output Groups. See the *BatteryVoltage* and *MainsLow* alarm monitors above.

On logical alarm monitors, you define both the event or internal action and the Alarm Output Group to activate, when the input signal is not in the normal state. See also the "[Control Unit Input Handler tab](#)", page 147.

Alarm Monitor Details tab

Click on the "**Details**" tab, to show its data.



This example shows a dialog box for the *BatteryVoltage* alarm monitor, displaying the Details tab.

The dialog boxes of all analogue, numeric and logical alarm monitors display similar information on their Details tab.

Read more about [Alarm Monitors](#) (page 324), in the [Functionality Description section](#).

<<< [Back to the "Alarm Monitor dialog boxes" on page 163](#)

Average Monitor

Displays the *input signal average value*, and the period of time the input signal has been measured.

- Click on the “Restart the average monitor” button to restart the monitor’s average calculations

Peak Monitor

The monitor displays the *input signal peak value*, since the measurements started.

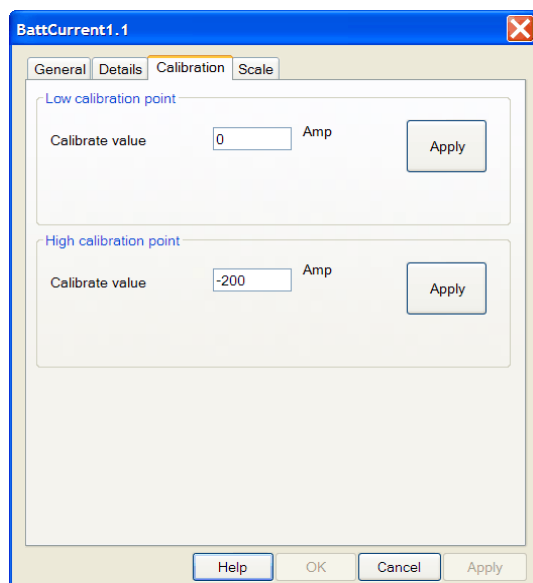
- Click on the “Restart the peak monitor” button to restart the monitor’s peak value measurements

Alarm Monitor Calibration tab

This tab is only displayed when the alarm monitor is used for monitoring following type of inputs and functions:

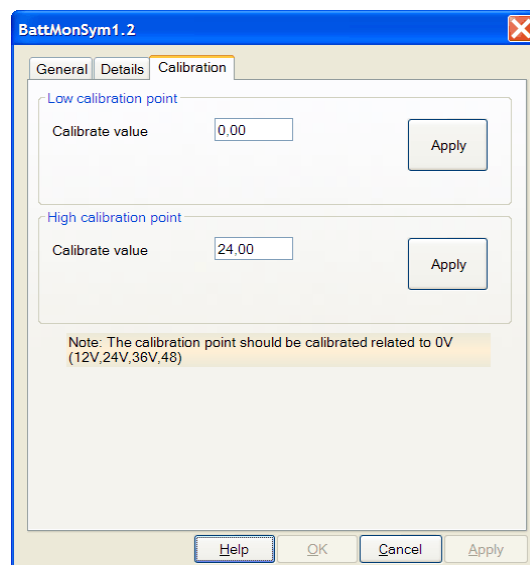
- **Current Sense Inputs**
These inputs are used for battery and load current measuring via current shunts.
Alarm monitors that monitor these inputs, (e.g “BatteryCurrentX”; **figure on the upper left side**) **require input calibration** (refer to the “Calibration” tab in this topic) and scaling (see “[Alarm Monitor Scale tab \(current shunt\)](#)” on page 171)
- **Voltage Monitoring Inputs**
These inputs are used for battery and symmetry voltage measuring.
Alarm monitors that monitor these inputs, (e.g “BattMonSymX”; **figure on the upper right side**) **require input calibration** (see the “Calibration” tab in this topic)
- **Temperature Sense Inputs**
These inputs are used for battery temperature measuring. Alarm monitors that monitor these inputs, (e.g “BatteryTempX”; **figure on the lower left side**) **require input calibration** (see the “Calibration” tab in this topic)
- **Earth Fault Detection Function**
This function is implemented in any of the *Smartpack2 Basic* controllers or newer *Eltek’s* controllers

Read more about [System Calibration](#) (page 218), in the [Functionality Description](#) section.



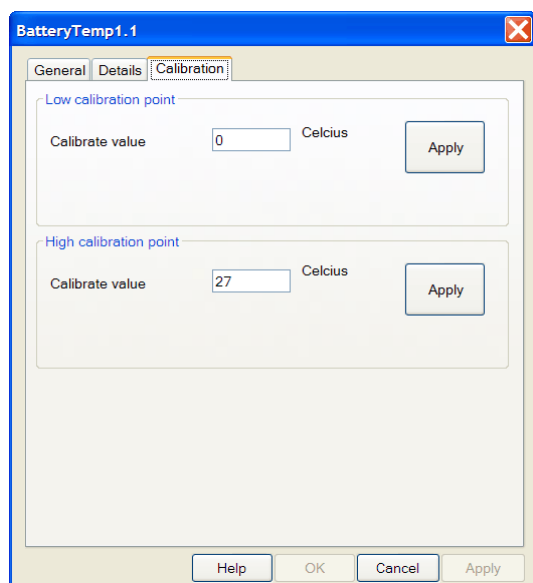
“Current Sense Input” Alarm Monitor

The dialog box above is displayed by **right-clicking** and selecting “**Calibrate**”, on any of the **links** on the “[Currents dialog box](#)” on page 127. Also, by clicking on the links and selecting the “**Calibration**” tab.



“Voltage Monitoring Input” Alarm Monitor

The dialog box above is displayed by **right-clicking** and selecting “**Calibrate**”, on any of the “**BattMonSymX**” **links** on the “[Battery Monitor dialog box](#)” on page 132. Also, by clicking on the links and selecting the “**Configuration**” tab.



“Temperature Sense Input” Alarm Monitor

The dialog box above is displayed by **right-clicking** and selecting “**Calibrate**”, on any of the **links** on the “[Temperatures dialog box](#)” on page 129. Also, by clicking on the links and selecting the “**Calibration**” tab.

The calibration of these alarm monitors consists of entering a High and a Low Calibration Point value.

In general, the calibration process consists of carrying out following steps:

High Calibration Point

1. Setting the power system at the **High Calibration Point** stage

2. **Measuring** the actual current, voltage or temperature with an accurate and reliable ammeter, voltmeter or thermometer
3. **Entering the measured value** in the system's control units (e.g. via the *PowerSuite* application).
 - Click on the “**Calibrate value**” field, on the dialog box's “**High Calibration Point**” area, and
 - Enter the measured value
 - Click on the **Apply button** by the field, to save the data
 - If required, click on the OK or Cancel button, to close the dialog box

Low Calibration Point

Only to be performed if calibration of the Low Calibration Point is necessary.

Read more about [System Calibration](#) (page 218), in the [Functionality Description](#) section.

1. Setting the power system at the **Low Calibration Point stage**
2. **Measuring** the actual current, voltage or temperature with an accurate and reliable ammeter, voltmeter or thermometer
3. **Entering the measured value** in the system's control units (e.g. via the *PowerSuite* application)
 - Click on the “**Calibrate value**” field, on the dialog box's “**Low Calibration Point**” area, and
 - Enter the measured value
 - Click on the **Apply button** by the field, to save the data
 - If required, click on the OK or Cancel button, to close the dialog box

NOTICE: When calibrating current shunts, you must also enter the current shunt rating, in addition to the low and high calibration measurements.

Refer to the Alarm Monitor Scale tab (current shunt) topic in *PowerSuite*.

NOTICE: Enter negative current measurements, when measured during battery discharging.

During battery charging, the battery current is defined as positive (+); during discharge, it is defined as negative (-)

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the “Alarm Monitor dialog boxes” on page 163](#)

Alarm Monitor Configuration tab

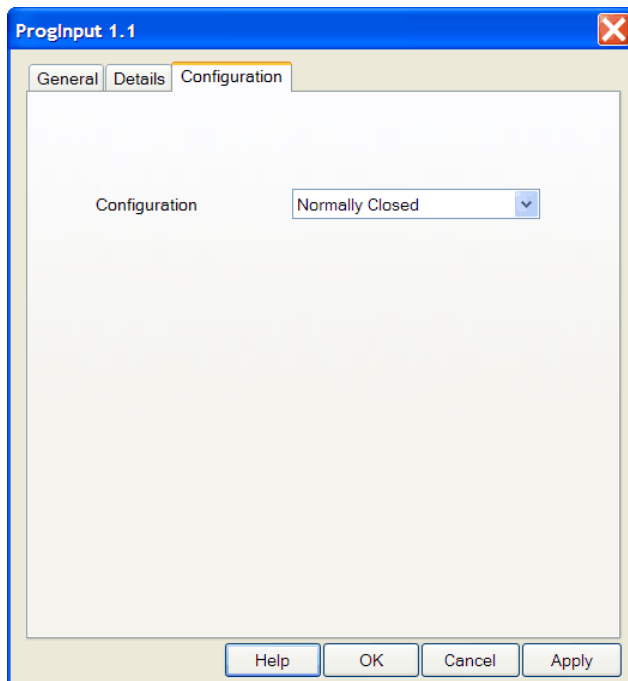
This tab is only displayed when the alarm monitor is used for monitoring external equipment -- via programmable inputs --, or when it is used for fuse monitoring.

- **Configurable Inputs (for monitoring external Relay Contacts)**
Configurable inputs (e.g “ProgInputX”; **figure on the left side**) usually monitor the position of connected external relay contacts.

The inputs are used switch monitoring on doors, fire alarm panels, AC generators and other external equipment. These alarm monitors **require input configuration** (see the “Configuration” tab in this topic).

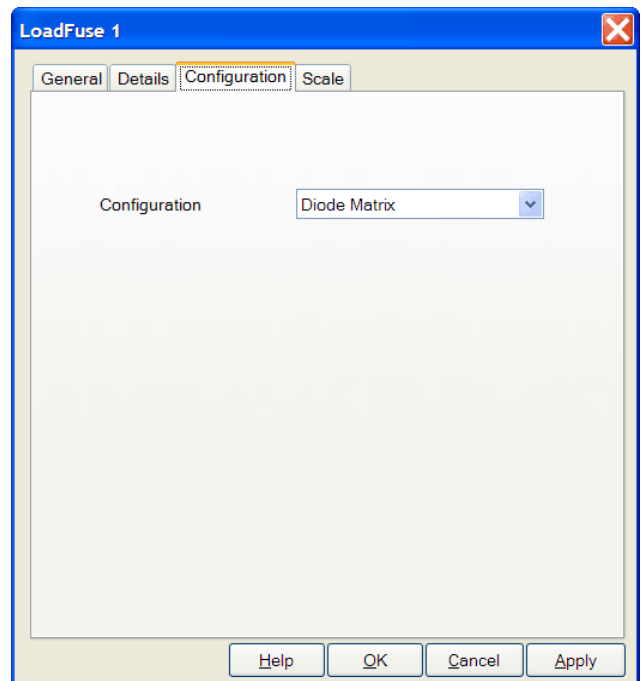
- **Configurable Inputs (for monitoring Fuses)**

Configurable inputs for Battery and Load Fuse Monitoring (e.g “LoadFuseX”; **figure on the right side**) usually monitor whether the fuses or breakers are tripped or not. The inputs are connected to the fuse’s NC-C-NO relay output or to a diode-matrix interface card, that monitor whether one or several connected breakers are tripped or not. These alarm monitors **require both input configuration** (see the “Configuration” tab in this topic) **and scaling** (see “[Alarm Monitor Scale tab \(fuses\)](#)” on page 172).



“Configurable Input” Alarm Monitor (for external relay contacts monitoring)

This dialog box is displayed by **right-clicking** and selecting “**Configure**”, on any of the **links** on the “[Control Unit Input Handler tab](#)”, page 147. Also, by clicking on the links and selecting the “**Configuration**” tab.



“Configurable Input” Alarm Monitor (for fuse monitoring)

This dialog box is displayed by **right-clicking** and selecting “**Configure**”, on any of the **links** on the “[Load Group nn dialog box](#)” on page 97. Also, by clicking on the links and selecting the “**Configuration**” tab.

To configure whether the **external relay contacts** -- connected to the inputs -- **are closed or open**, when the input is in normal state, do following:

- **Click** on the drop-down arrow, **and select**
 - *Normally Closed* (The external relay contacts are closed, when the input is in normal state)
 - *Normally Open* (The external relay contacts are open, when the input is in normal state)
 - *Diode Matrix* (The input is connected to the control system using a factory installed interface card)
- **Click** on the **Apply** button and on the OK button, to save the selection and close the dialog box

NOTICE: In order to implement monitored fail-safe input circuits, the external relay coil must be energized and the relay contacts closed, when in normal state or fuse not tripped.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

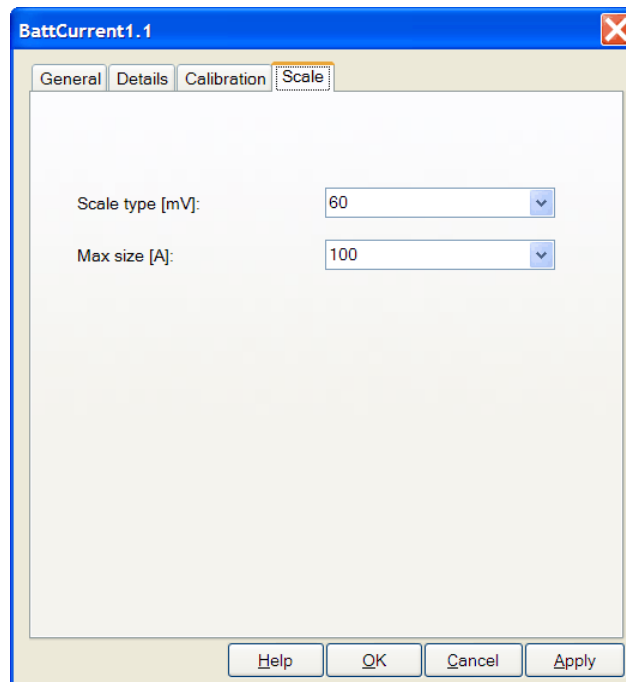
<<< [Back to the “Alarm Monitor dialog boxes” on page 163](#)

Alarm Monitor Scale tab (current shunt)

This tab is only displayed when the alarm monitor is used for load or battery current monitoring, e.g. the “BatteryCurrentX” -- which you find in the “[Currents dialog box](#)” on page 127.

These alarm monitors **require both input calibration** (see “[Alarm Monitor Calibration tab](#)” on page 167) **and scaling** (see the “Scale tab (current shunt)” in this topic).

Read more about [System Calibration](#) (page 218) in the [Functionality Description](#) section.



This dialog box is displayed by **right-clicking** and selecting “**Scale**”, on the “**BatteryCurrentX**” link that you find in the “[Currents dialog box](#)” on page 127. Also, by clicking on the link and selecting the “**Scale**” tab.

The scaling of shunts consists of entering the shunt’s ratings, e.g. 100A/60mV. Do following:

- **Click** on the “**Scale type (mV)**” drop-down arrow, and select the shunt’s rating, e.g. “60”
- **Click** on the “**Max size (A)**” drop-down arrow, and select the shunt’s rating, e.g. “100”
- **Click** on the **Apply** button and on the OK button, to save the data and close the dialog box

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the “Alarm Monitor dialog boxes” on page 163](#)

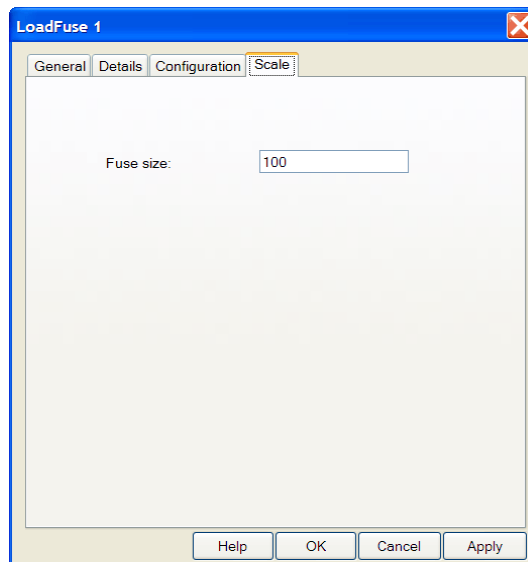
Alarm Monitor Scale tab (fuses)

This tab is only displayed when the alarm monitor is used for load or battery fuse monitoring.

These alarm monitors **require both input configuration** (see “[Alarm Monitor Configuration tab](#)” on page 169) **and scaling** (see the “Scale tab (fuses)” in this topic).

Configurable inputs for Battery and Load Fuse Monitoring (e.g “LoadFuseX”) usually monitor whether the fuses or breakers are tripped or not. The inputs are connected to the fuse’s NC-C-NO relay output or to a diode-matrix interface card, that monitor whether one or several connected breakers are tripped or not.

Read more about [System Calibration](#) (page 218) in the [Functionality Description](#) section.



This dialog box is displayed by **right-clicking** and selecting “**Scale**”, on the “**LoadFuseX**” link that you find in the “[Load Group nn dialog box](#)” on page 97. Also, by clicking on the link and selecting the “**Scale**” tab.

The scaling of fuses consists of entering the fuse or breaker size. The size is then displayed in other dialog boxes. Do following:

- **Click** in the “Fuse size” field and enter the fuse size in Ampere
- **Click** on the **Apply** button and on the OK button, to save the data and close the dialog box

NOTICE: If you have configured the fuse or breaker to “*Diode Matrix*” (monitoring using a factory installed interface card), then you should enter “0” in the “Fuse size” field.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

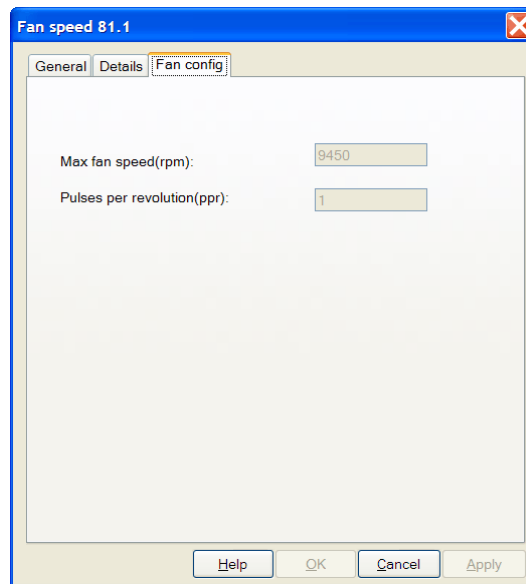
<<< [Back to the “Alarm Monitor dialog boxes” on page 163](#)

Alarm Monitor Fan Speed Configuration tab

This tab is only displayed when the alarm monitor is used for fan speed monitoring, e.g. the “Fan Speed X” alarm monitor -- which you find on the “I/O Outdoor nn” dialog box, in the Outdoor tab.

These alarm monitors **are already configured from factory**, and monitor the fan speed of fan-cooled outdoor cabinets.

The parameters entered in this alarm monitor are specific for each fan type. Refer to the type of fan used in the outdoor cabinet.



You can either right-click on the “Fan Speed X” alarm monitor link -- that you find on the “I/O Outdoor nn” dialog box, in the Outdoor tab -- and select **Configure**, or click on the link and then click on the “Fan Config” tab.

NOTICE: Please contact your closest *Eltek* representative or service engineer if you need to configure fan speed in the outdoor cabinet.

Read more about The I/O Monitor Control Unit - Overview in the [Functionality Description](#) section.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

<<< [Back to the “Alarm Monitor dialog boxes” on page 163](#)

Tutorials

Click on each tutorial topic, to learn about some of the main *PowerSuite* concepts and features to get you configuring your power system as quickly as possible.

How to Check your Access Level in PowerSuite

Goal:

This tutorial will show you how to find out which access level -- *User*, *Service* or *Factory* -- you are logged on with in *PowerSuite*.

Description:

Read the topic “[Checking the active Access Level](#)”, page 29, to find out.

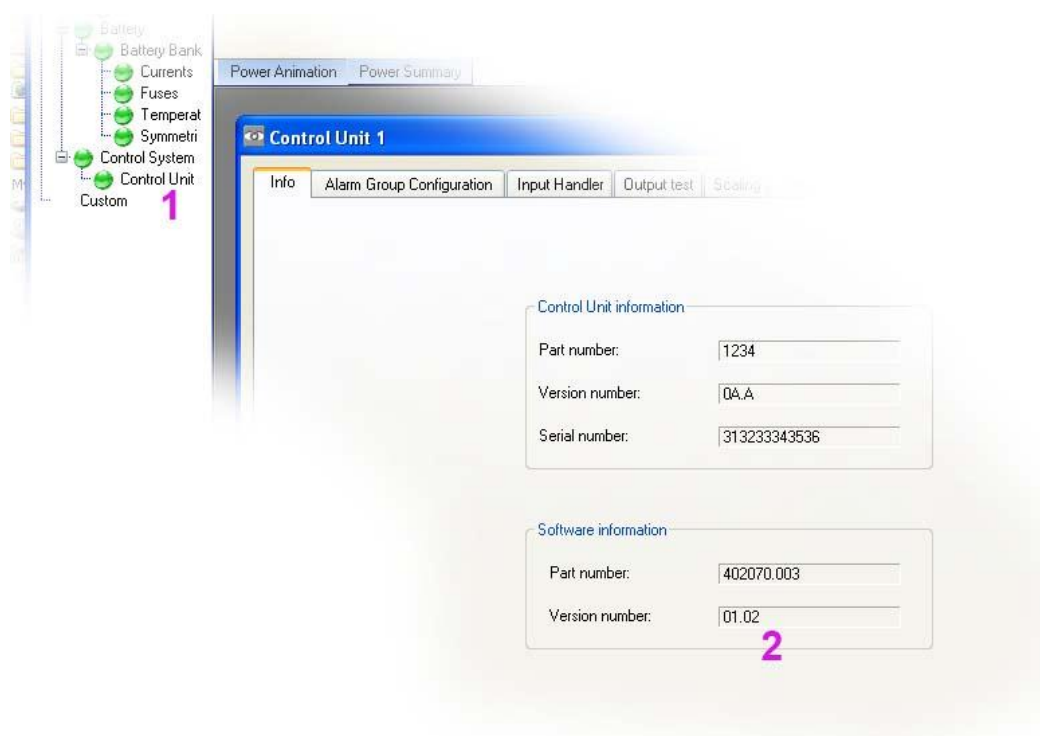
How to Check the Smartpack’s Firmware Version

Goal:

This tutorial will show you how to find out which firmware version is installed in your *Smartpack* controller.

Description:

Do following to check the *Smartpack* controller’s firmware version:



- A. **Double-click on the control unit’s icon (1)** on the Power Explorer pane
- B. **Read or jot down the controller’s firmware version displayed** in the Control Unit’s dialog box (2), in the Info tab

How to Configure Alarm Output Groups

Goal:

This tutorial will show you how to configure one of the Alarm Output Groups (AOG) that are usually unassigned from factory.

Read more about [Alarm Output Groups](#) (page 328), in the [Functionality Description](#) section.

NOTICE: To edit Alarm Output Groups' assignments, you have to be logged in with the Service Access Level password, read "[Log In dialog box](#)", page 28.

Description:

In this tutorial, we want to create an Alarm Output Group with the name of "Generator AOG", and assign alarm relay outputs 1 and 2 to the group. We will use the unassigned Alarm Group 8.

Start by clicking on the "Alarms Overview" button, on the toolbar; then click on the "Outputs" tab, and finally select the "Smartpack 1" control unit, to display the unit's relay outputs.

Alarm group	Relay Output 1	Relay Output 2	Ba	Lo	Alarm output3	Alarm output4	Alarm output5	Alarm output6	Counter
Major alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	1
Minor alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	1
Mains alarm OG	☒	☒	☐	☐	☐	☐	☐	☐	0
Fuse alarm OG	☒	☐	☐	☐	☒	☐	☐	☐	2
Battery high AOG	☒	☐	☐	☐	☐	☒	☐	☐	0
Battery low AOG	☒	☐	☐	☐	☐	☐	☒	☐	0
RectifierAlarmOG	☒	☐	☐	☐	☐	☐	☐	☒	0
Generator AOG	☒	☒	☐	☐	☐	☐	☐	☐	0
Fire Alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	0
Door Alarm OG	☒	☐	☐	☐	☐	☐	☐	☐	0
Cooling AOG	☒	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 12	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 13	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 14	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 15	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 16	☐	☐	☐	☐	☐	☐	☐	☐	0
Alarm Group 17	☐	☐	☐	☐	☐	☐	☐	☐	0
OutpBlocked	☐	☐	☐	☐	☐	☐	☐	☐	0
LVBD	☐	☐	☒	☐	☐	☐	☐	☐	0
LVLD1	☐	☐	☐	☒	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0
	☐	☐	☐	☐	☐	☐	☐	☐	0

To create the Alarm Output Group, perform the following steps:

1. **Edit the group's name** by, clicking on "Alarm Group 8", on the first column, and change it to "Generator AOG"
2. **Assign the alarm relay outputs to the group** by, clicking (checked) on the Relay Output 1 and 2 check boxes, on the same row as "Generator AOG"
3. **Save the assignment** by, clicking on the **Apply** and the **OK** buttons to save the assignment

Read also "[Editing Alarm Output Group's Name and Output Assignments](#)" on page 61.

Now when an alarm monitor assigned to the "Generator AOG" Alarm Output Group raises an alarm, the alarm relay outputs 1 and 2 will change from open to close or vice versa.

For information about the alarm relay outputs' name and normal state, read [“Editing the Alarm Output’s Name and Operation”](#), page 62.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

How to Configure Alarm Monitors & Programmable Inputs

Goal:

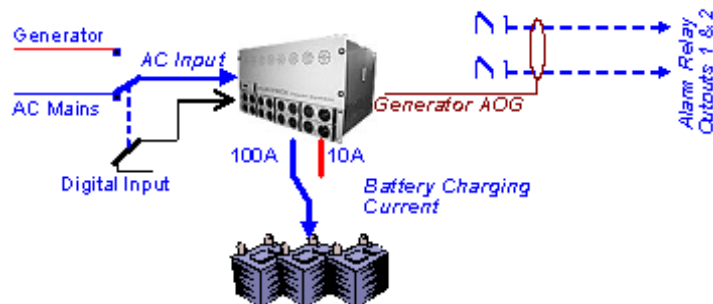
This tutorial will show you how to activate and configure an alarm monitor to check the status of a programmable input, used to monitor an external AC generator. When the AC generator supplies the DC power system, the alarm monitor will limit the battery charging current and activate several alarm output relays.

Read more about [Alarm Monitors](#) (page 324) and [Alarm Output Groups](#) (page 328), in the [Functionality Description](#) section.

NOTICE: To configure alarm monitors, you have to be logged in with the Service Access Level password, read [“Log In dialog box”](#), page 28.

Description:

In this tutorial, we want to configure an alarm monitor for programmable input “ProgInput 1.1”, to monitor when the AC supply is switched from AC Mains to an external AC generator. Then, when the AC generator is feeding the DC power system, the alarm monitor will limit the system’s battery charging current from 100A to 10A. It will also activate the “Generator AOG” Alarm Output Group (alarm relays 1 and 2).



To configure the alarm monitor to function as described, you must perform the following steps:

1. Configure the Alarm Output Group
2. Configure the Battery Charging Current Limitation
3. Configure the Alarm Monitor

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Continue with the tutorial’s [“Step 1 - Configure the Alarm Output Group”](#) on page 177.

Step 1 - Configure the Alarm Output Group

To name an Alarm Output Group as “*Generator AOG*” and configure it to activate relay outputs 1 and 2, read the tutorial “[How to Configure Alarm Output Groups](#)”, page 174.

Continue with the tutorial’s “[Step 2 - Configure the Battery Charging Current Limitation](#)” on page 177.

Step 2 - Configure the Battery Charging Current Limitation

Double-click on the **Battery icon** in the **Power Explorer** pane. Click on the “**Configuration**” tab (A), and on the “**Current Limitation**” tab (B), in the middle of the dialog box.

1. **Enter the Generator Feed charging current limit (C)** by, clicking on the Generator Feed “*Current Limit Value (A)*” text field, to insert the cursor, and then typing <10>.

For information about how to edit an alphanumeric field, refer to the Glossary section.

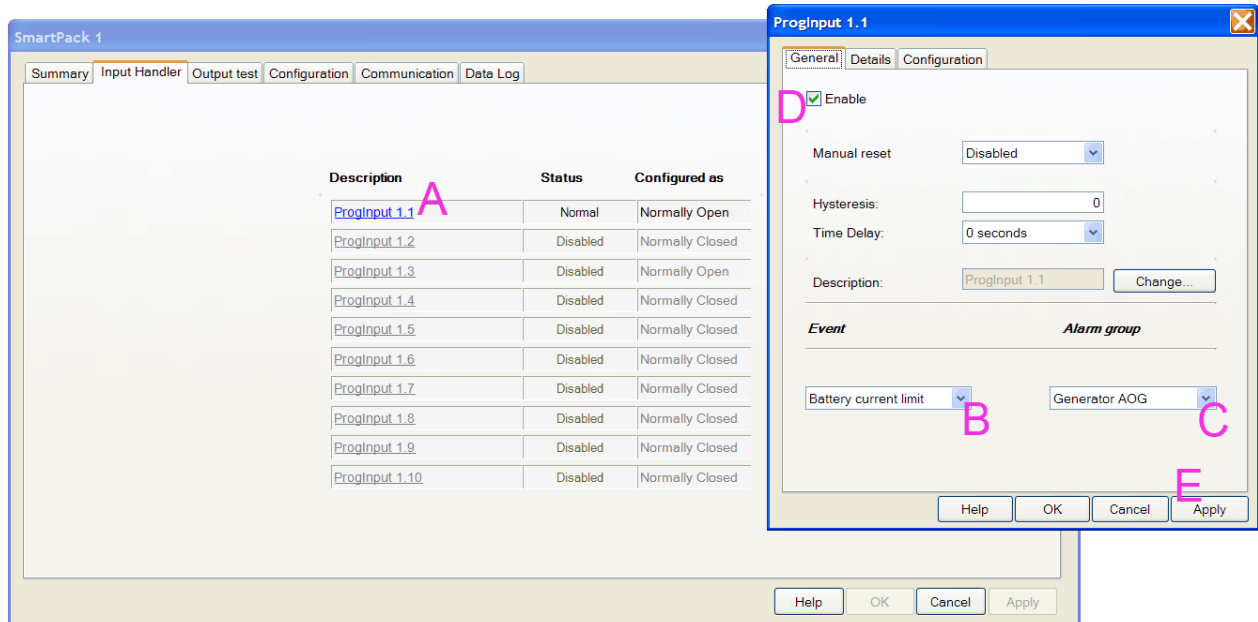
2. **Activate the current limitation (D)** by, clicking on the “Activate” check box, to check it
3. **Save the configuration (E)** by, clicking on the “Apply” button

You find more information about the [Battery Charging Current Limitation](#) (page 317), in the [Functionality Description](#) section.

Continue with the tutorial's "[Step 3 - Configure the Alarm Monitor](#)" on page 178.

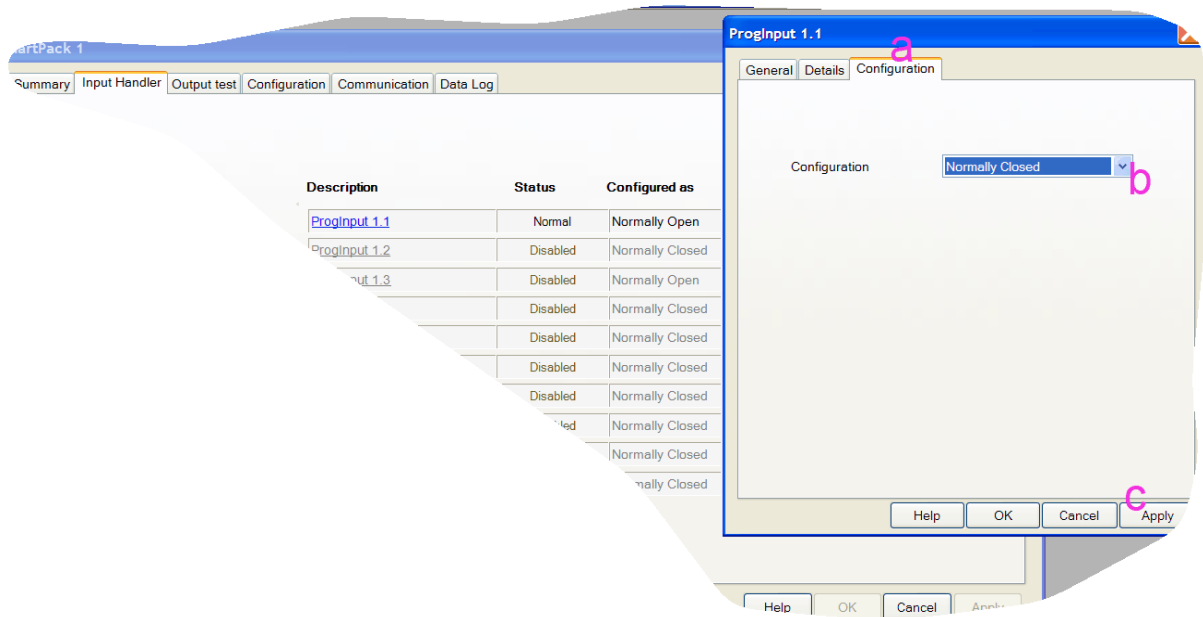
Step 3 - Configure the Alarm Monitor

Double-click the **Control Unit** icon in the **Power Explorer** pane, and then click on the **"Input Handler"** tab.



1. **Open the alarm monitor (A)** by, clicking on the "ProgInput 1.1" link (A)
The alarm monitor's dialog box "ProgInput 1.1" is displayed
2. **Select the Battery Current Limit event (B)** by, clicking on the drop-down arrow (B), and selecting *Battery Current Limit* from the list
3. **Select the Generator AOG alarm group (C)** by, clicking on the drop-down arrow, and selecting *Generator AOG* from the list
4. **Activate the alarm monitor (D)** by, clicking on the Enable check box, to check it
5. **Save the alarm monitor configuration (E)** by:
-- Clicking on the Apply button (E)
6. **Save the configuration (H)** by, clicking on the Apply button (H), and close the "Control Unit 1" dialog box by clicking on its OK button

AND continue selecting the input's activation pattern, as follows: (see figure below)



7. Click on the **Configuration tab (a)**, and
8. **Select the input's activation pattern by:**
clicking on the drop-down arrow (b), and select *Normally Closed* (The external relay contacts are closed, and the relay coil energized, when the AC Generator is not supplying the DC power system)
9. Click on the **Apply (c)** and the **OK buttons**

The “*ProgInput 1.1*” alarm monitor link is now active and in blue text.

For information about how to use the drop-down list, refer to the Glossary section.

Now you have configured *PowerSuite* so that when the AC generator supplies the DC power system, the alarm monitor will limit the battery charging current and activate several alarm output relays.

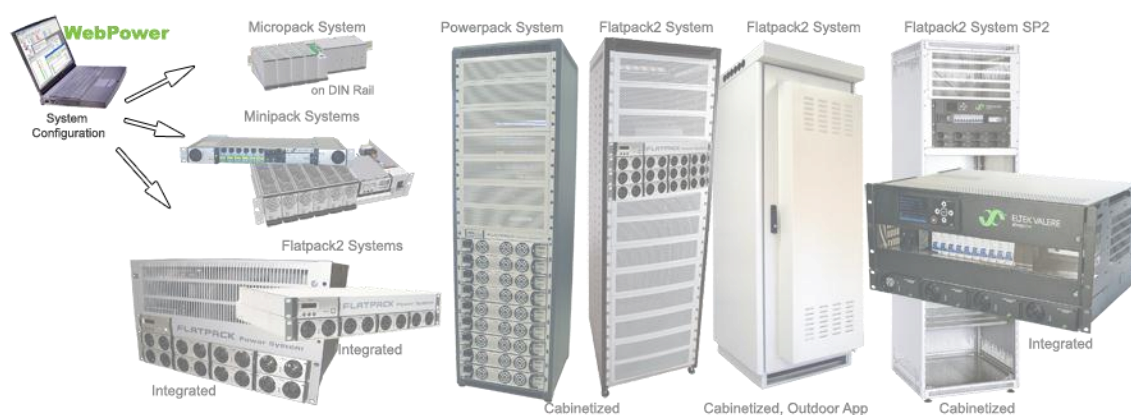
Now you are finished with tutorial “[How to Configure Alarm Monitors & Programmable Inputs](#)” on page 176.

Functionality Description

Functionality Overview

Functionality Description Online Help System, 350020.073, 1v4, 2012-02-08
[Copyright](#)

This section offers a more detailed description of the functionality that *Eltek* has implemented in *Smartpack2*-, *Smartpack*- and *Compack*-based DC power supply systems.



Select a topic, for detailed description of actual functions.

- [“About Power System Configuration”](#) on page 181
Overview of the types of user interfaces available to configure the power system, and how the parameters and system functionality are organized and grouped
- [“Power System Functions”](#) on page 197
Explains general topics related to the DC power supply system
- [“Mains Functions”](#) on page 256
Describes functions related to the DC power system’s AC Mains input
- [“Generator Functions”](#) on page 258
Describes functions related to the DC power system’s AC Mains input, when supplied by a generator or *gen-set* (engine-generator set)
- [“Rectifier Functions”](#) on page 278
Clarifies functionality related to the DC power system’s rectifiers
- [“Load Functions”](#) on page 289
Describes the functionality associated to the power system’s DC load

- [“Battery Functions”](#) on page 294
Gives explanation to topics associated to the DC power system’s battery bank
- [“Control System Functions”](#) on page 323
Clarifies the functionality of the control system -- the *Smartpack2*, the *Smartpack* and the *Compack* controllers, and other type of control units
- [“Tutorials”](#) on page 367
A few How-to, step-by-step descriptions about commonly used procedures

About Power System Configuration

The *Eltek* DC power supply system’s functionality represents a vast **set of functions, characteristics or capabilities** implemented in the hardware and software of the controllers, control units and nodes connected to the system’s CAN bus.

You can use following types of **user interfaces** to access the functions and parameters:

- **The controllers’ front panel keypad**
using software menus and submenu options
- **A standard web browser**
to access the *WebPower* firmware, a platform-independent graphical user interface (GUI) built-in the controllers.
Read also topics
[“Networking the Controller - Access Methods”](#) on page 197, and
[“Power System Configuration & Monitoring – Methods”](#) on page 206.
The *WebPower* Online Help is also useful reading.
- **The *PowerSuite* program**
An application run on computers using MS Windows operating systems. The *PowerSuite* Online Help is useful reading.

All the mentioned functions, characteristics and parameters are **fully configurable**, and are organized in following **system-oriented logical groups**:

- Power System
- Mains
- Generator
- Rectifiers
- Battery
- Load
- Control System

Also, these functions, characteristics and parameters are presented in following **task-oriented logical groups**:

1. System Status
2. System Configuration
3. Alarm Configuration
4. Commands

5. Logs and Reports
6. Statistics
7. Commissioning
8. Up/Download

Menu Options - Smartpack2 Master Controller

The *Smartpack2*-based DC power system's functionality is also accessed via the *Smartpack2 Master* controller's network of software menus and submenus, enabling you to configure and control the whole power system.

The functionality is accessible at 3 different access levels: User, Service (password protected) and Factory (Eltek's service personnel only). Read more in topic "[Access Levels](#)" on page 323.

The *Smartpack2 Master* controller's **menu options** are grouped in these *task-oriented* logical groups, as described in the topics below.

System Status options

Configuration **changes are not allowed** at System Status level. To make changes you have to access the System Configuration options, the Alarm Configuration options or similar.

This logical group presents the important system parameters, which indicate **the status of the power system**, such as number of battery banks, voltage, current, temperatures, fuse status, inputs and outputs status, and many similar parameters.

The presented parameters are organized in **system-oriented groups**: Power System, Mains, Generator, Rectifier, etc.

Refer to these topics (Mains, Rectifiers, etc.) for more information about the System Status parameters.

You can display the system status parameters using any available computer based GUI, or from the *Smartpack* and the *Smartpack2 Master* controllers' displays.

From the Smartpack2 Master Controller's Front

You can display the following parameters, via the *Smartpack2 Master* controller's front keys:

Available options in *Smartpack2 Master* Controller's submenu:

System Status > **Mains**

#	Description	Value	Unit/Label	Note
	NoOfPhases	1		
	Mains Fail	0	Units	
	Mains Volt 1	--	Volt AC	

Available options in *Smartpack2 Master* Controller's submenu:

System Status > **Rectifiers**

#	Description	Value	Unit/Label	Note
	NoOfRectifiers	4		
	RectifierCurrent	0,0	Amp	
	RectifierError	1	Units	

RectComm Error	1	Units
Rect Capacity	0	%
RectCurrent ShareErr	0	%
Rectifier Temp	0	Celsius

By pressing  the following (a deeper page in the same level) is displayed:

#	SerialNo	Status	Curr	Tmp	VoltIn
1	Xxxx	Err.	0,0	0	0

Read also topic “[Rectifier Functions](#)” on page 278.

Available options in *Smartpack2 Master Controller*’s submenu:

System Status > **Load**

#	Description	Value	Unit/Label	Note
	NoOfLoadBanks	1		
	LoadCurrent	35,0	Amp	
	Status Fuse	Norm.		
	Status LVLD	Normal		

By pressing  the following (a deeper page in the same level) is displayed:

#	Description	Value	Unit/Label	Note
	LoadBank 1			
		Err		
		0,0		
		0,0		
		0,0		

Available options in *Smartpack2 Master Controller*’s submenu:

System Status > **Battery**

#	Description	Value	Unit/Label	Note
	Battery Voltage	54,46	Vold DC	
	Battery Current	-35,0	Amp	
	Battery Temp	29	Celsius	
	Battery Life Time	0	Days	
	LVBD	Norm		
	Fuse	Norm		
	Battery Quality	--	%	
	Battery Tot Cap	100	Ah	
	Battery Rem Cap	0	%	
	Battery Time Left	0	min	
	Delta String Curr	0	%	
	Battery Used Cap	100	%	

By pressing  the following (a deeper page in the same level) is displayed:

#	Description	Value	Unit/Label	Note
	Battery Bank1			
	Batt Volt bank 1	52,46	Volt DC	
	BattCurr bank 1	-35,0	Amp	
	Battery Fuse 1.1	Norm		
	Battery Fuse 1.2	Disab.		
	Battery Temp 1.1	29	Celsius	
	Battery Temp 1.2	0	Celsius	
	Battery Temp 1.3	27	Celsius	
	Battery Temp 1.4	27	Celsius	
	Battery Temp 1.5	28	Celsius	
	Battery Temp 1.6	27	Celsius	
	BatteryCurrent 1.1	-35,0	Amp	
	BatteryCurrent 1.2	0	Amp	
	Battery Monit 1			
		0		

	Err
	0,0
deltaV	0,00
deltaV	0,00

Available options in *Smartpack2 Master Controller's* submenu:

System Status > **Inputs**

#	Description	Status	Group	Event	Note
	ProgInput 1.1	Disab.	Major Alarm	MajorAl	
	ProgInput 1.2	Disab.	Major Alarm	MajorAl	
	ProgInput 1.3	Disab.	Major Alarm	MajorAl	
	ProgInput 1.4	Disab.	Major Alarm	MajorAl	
	ProgInput 1.5	Disab.	Major Alarm	MajorAl	
	ProgInput 1.6	Disab.	Major Alarm	MajorAl	
	ProgInput 1.7	Disab.	Major Alarm	MajorAl	
	ProgInput 1.8	Disab.	Major Alarm	MajorAl	
	ProgInput 1.9	Disab.	Major Alarm	MajorAl	
	ProgInput 1.10	Disab.	Major Alarm	MajorAl	
	ProgInput 1.11	Disab.	Major Alarm	MajorAl	
	ProgInput 1.12	Disab.	Major Alarm	MajorAl	
	ProgInput 1.13	Disab.	Major Alarm	MajorAl	
	ProgInput 1.14	Disab.	Major Alarm	MajorAl	

Available options in *Smartpack2 Master Controller's* submenu:

System Status > **Outputs**

#	Alarm Group	Status	Output	Note
	Major Alarm	Activated	--	
	Minor Alarm	Activated	--	
	Mains Alarm	Normal	--	
	Alarm Group 04	Normal	--	
	Alarm Group 05	Normal	--	
	Alarm Group 17	Activated	--	
	OutpBlocked	Activated	--	
	LVBD	Normal	--	
	LVL1	Normal	--	

Available options in *Smartpack2 Master Controller's* submenu:

System Status > **Control System**

The display is divided in 2 areas, the upper one U is fast, the lower one L can be browsed.

#	Description	Value	Unit	Note
	NoOfCtrlUnits	5		
	SP2 Basic	CtrlUnitError	0	Units
	SmartNode	CtrlUnitError	0	Units
	Battery Monitor	CtrlUnitError	1	Units
	Load Monitor	CtrlUnitError	1	Units
	I/O Unit	CtrlUnitError	1	Units I/O Monitors
	Mains Monitor	CtrlUnitError	0	Units
	(lower area L)			
	Battery Temp 1.1	29	Celsius	
	Battery Temp 1.2	0	Celsius	
	Battery Temp 1.3	27	Celsius	

Battery Temp 1.4	29	Celsius
Battery Temp 1.5	0	Celsius
Battery Temp 1.6	27	Celsius

Available options in *Smartpack2 Master Controller*'s submenu:

System Status > **Generator**

#	Description	Value	Unit	Note
	Generator Fail	Disab.		
	Generator activation	Off		
	Discharge value [%]	000		
	Main Delay [min]	000		
	Charge Time [min]	000		

Available options in *Smartpack2 Master Controller*'s submenu:

System Status > **SolarConv**

#	Description	Value	Unit	Note
	NoOfSolar Converters	0		
	Solar Current	0,0	Amp	
	Solar Charger Err	0	Units	
	Solar Comm Err	0	Units	
	Solar Capacity	0	%	
	Solar Symmetry Err	0	%	
	Solar Charger Temp	0	Celsius	

By pressing  the following (a deeper page in the same level) is displayed:

#	SerialNo	Status	Curr	Tmp	VoltIn
1	Xxxx	Err.	0,0	0	0

System Configuration options

The options in this logical group let you change all the relevant system parameters, values and characteristics, such as temperature scales, system polarity, language, system voltages, rectifiers and battery related values, and many similar parameters.

Configuration **changes are allowed** at this level, using a Pin-Code.

NOTICE:

The default Service Access Level password or Pin-Code is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

Read about "[Access Levels](#)" on page 323.

The parameters are organized in *system-oriented groups*: Power System, Mains, Generator, Rectifier, etc.

Refer to these topics (Power System, Mains, Rectifiers, etc.) for more information about the System Configuration parameters.

You can display the system configurable parameters using any available computer based GUI, or from the *Smartpack* and the *Smartpack2 Master* controllers' displays.

From the Smartpack2 Master Controller's Front

You can display the following system configurable parameters, via the *Smartpack2 Master* controller's front keys:

2.1 Power System

2.1.1 General System Configuration

Available options in *Smartpack2 Master* Controller's submenu:

System Configuration > Power System > **General System Configuration**

#	Description	Value	Unit/Label	Note
	Reference Voltage [V/Cell]	2,27	48 V system	↑↓
	Number of Battery Cells	24		↑↓
	Battery Capacity scale – Ahr/Percent?	☒	Percent	Displays the battery capacity scale in the Status Mode display as A per hour or in percent (of what?)
	Temp. scale – Celsius/Fahrenheit?	☒	Fahrenheit	
	Sys Polarity – Positive/Negative?	☒	Negative	
	Curr Resolution – Amp/DeciAmp?	☒	DeciAmp	
	Generator Func – Std/Advanced?	☒ Std	☐ Adv	
	Critical Criteria	MainsMinorLow		Other options: "MMiLo AND BCMiLo", "MMiLo OR BCMiLo", "BattCurrMinorLow"
	Language	English		
	Year	2009		
	Month	01		
	Day	01		
	Hour	00		
	Minute	00		
	Agent IP Address	172 016 006 222		
	Network Subnet Mask	000 000 000 000		
	Change Service PassWd	0000		

2.1.2 System Voltage Levels

Refer to topic "[System Voltages Levels](#)" on page 216, to see available options in *Smartpack2 Master* Controller's submenu:

System Configuration > Power System > **System Voltages Levels**

2.1.3 System Calibration

Available options in *Smartpack2 Master* Controller's submenu:

System Configuration > Power System > **System Calibration**

#	Description	Value	Unit/Label	Note

Voltage HiPoint Cal. Value [V]	53,00
Voltage HiPoint A/D Value	694
Voltage LoPoint Cal. Value [V]	0,15
Voltage LoPoint A/D Value	0
Current HiPoint Cal. Value [A]	5300
Current HiPoint A/D Value	690
Current LoPoint Cal. Value [A]	15
Current LoPoint A/D Value	0

2.2 Mains

Available options in *Smartpack2 Master Controller*'s submenu:

System Configuration > **Mains**

#	Description	Value	Note
	NoOfPhases	1	

2.3 Rectifiers

Available options in *Smartpack2 Master Controller*'s submenu:

System Configuration > **Rectifiers**

#	Description	Value	Unit/Label	Note
	BoOfRectifiers	01		
	Suppr. RectErr d.MainsFail-Yes/No?	☒	Yes	
	Rect. WalkIn time-Short/Long?	☒	Short	
	Rect. var. BattPowered or Not?	☒	BattPowered	
	OVS Limit [V/Cell]	2,4583	59,00	
	Rect. CurrentLimit enable-On/Off?	☐	On	
	Rect. CurrentLimit value [A]	1000		
	Rect. EmergencyVolt value [V]	53,25		
	Gen. dep. StartUpDelay-On/Off?	☐	On	
	Generator StartUp delay [min]	000		
	Efficiency Management?	☐ / ☐	On/HEPri.	

Read also topic "[Rectifier Functions](#)" on page 278.

2.4 Load

Available options in *Smartpack2 Master Controller*'s submenu:

System Configuration > **Load**

#	Description	Value	Unit/Label	Note
	NoOfLoadBanks	1		
	No. of LVLDs in Bank 01	0		

2.5 Battery

2.5.1 Battery Configuration

Available options in *Smartpack2 Master Controller's* submenu:

System Configuration > **Battery** > **Battery Config**

#	Description	Value	Unit/Label	Note
	NoOfBatteryBanks	01		
	NoOfBattery Strings	01		
	Capacity per String [Ah]	100		
	Temp. Compensation – On/Off?	☐	On	
	Reference Voltage [V/Cell]	2,2708	54,50	
	Reference Temperature [C]	20		
	Temperature Slope [mV/C/Cell]	3,00		
	Min. Compensation Volt. [V/Cell]	2,1000		
	Max. Compensation Volt. [V/Cell]	2,3500		
	Battery Current Limit On/Off	☐	On	
	CurrentLimitValue [A] (Mains Feed)	30		
	CurrentLimitValue [A] (Gen Feed)	30		

2.5.2 Battery Test Configuration

Available options in *Smartpack2 Master Controller's* submenu:

System Configuration > **Battery** > **Battery Test Config**

#	Description	Value	Unit/Label	Note
	Normal or Simplified BattTest?	☐	Simple	
	EndVoltage Simple test [V/Cell]	1,90		
	Max. TestDuration-Enable/Disable?	☐	Enable	
	Max. TestDuration [min]	720		
	Max. DischargeStop-Enable/Disable?	☐	Enable	
	Max. Discharge stop [Ah]	100		
	GuardTime – Enable/Disable?	☐	Enable	
	GuardTime – [hours]	12		
	AlarmGroup to activate during tst	--		Browser though registered alarm groups
	IntervalTest – Enable/Disable?	☐	Enable	
	Next Interval StartYear	2010		
	Next Interval StartMonth	04		
	Next Interval StartDay	16		
	Next Interval StartHour	12		
	Next Interval StartMinute	00		
	Interval Period [days]	0180		
	AutoTest – Enable/Disable?	☐	Enable	
	Discontinuance Test Enable/Disable?	☐	Enable	
	Repeat frequency [days]	07		
	Max. duration [minutes]	05		

2.5.3 Battery Boost Configuration

Available options in *Smartpack2 Master Controller's* submenu:

System Configuration > **Battery** > **Battery Boost Config**

#	Description	Value	Unit/Label	Note
	Boost Voltage [V/Cell]	2,3542	56,50	
	StopBoost CurrThreshold Ena/Disa?	☐	Enable	
	StopBoost CurrThreshold [A]	10		
	AlarmGrp to activate during boost	--		Browser though registered alarm groups
	ManBoost MaxDuration [min]	120		
	IntervalBoost – Enable/Disable?	☐	Enable	
	Next Interval StartYear	2010		
	Next Interval StartMonth	04		
	Next Interval StartDay	16		
	Next Interval StartHour	12		

#	Description	Value	Unit/Label	Note
	Next Interval StartMinute	00		
	Interval Period [days]	0180		
	IntervalBoost MaxDuration [min]	120		
	AutoBoost – Enable/Disable?	☐	Enable	
	AutoBoost MaxDuration [min]	120		
	AutoBoost ChargeFactor [%]	100		
	AutoBoost DischargeThresh. [Ah]	0001		
	AutoBoost VoltThreshold Ena/Disa?	☐	Enable	
	AutoBoost VoltThreshold [V]	46,00		

2.5.4 Symmetry Configuration

Available options in *Smartpack2 Master Controller*'s submenu:

System Configuration > **Battery** > **Symmetry Config**

#	Description	Value	Unit/Label	Note
	Symm. Measurement - Ena/Disa?	☐	Enable	
	Symmetry Voltage range [V]	12	V Measurement	
	Symm. Mode – Continuous/Dischrg?	☐	Discharge	
	Symmetry DischargeDelay [min]	000		

2.5.5 Battery Life Time Configuration

Available options in *Smartpack2 Master Controller*'s submenu:

System Configuration > **Battery** > **Battery Life Time Config**

#	Description	Value	Unit/Label	Note
	Temperature Range 01 - Ena/Disa?	☐	Enable	
	Temperature Limit [C]	010		
	Temperature Weigh	001		
	Hours within Temperature Range	0		
	Temperature Range 02 - Ena/Disa?	☐	Enable	
	Temperature Limit [C]	010		
	Temperature Weigh	001		
	Hours within Temperature Range	0		
	Temperature Range 03 - Ena/Disa?	☐	Enable	
	Temperature Limit [C]	010		
	Temperature Weigh	001		
	Hours within Temperature Range	0		

				Up to 10 ranges available
	Temperature Range 10 - Ena/Disa?	☐	Enable	
	Temperature Limit [C]	010		
	Temperature Weigh	001		
	Hours within Temperature Range	0		

2.6 Generator

Read topic “[AC Generator as AC Mains](#)” on page 258, for available options in *Smartpack2 Master Controller*'s submenu:

System Configuration > **Generator**

2.7 Solar Converter

Available options in *Smartpack2 Master Controller's* submenu:

System Configuration > **Solar Conv**

#	Description	Value	Unit/Label	Note
	NoOfSolarConverters	00		
	Suppr. SolErr d.MainsFail – Yes/No?	☐	Yes	
	OVS Limit [V/Cell]	2,4583	59,00	

Alarm Configuration options

All the power system's **alarms are fully configurable**, and are implemented using Alarm Monitors (software modules). These software modules monitor input signals and logical states, and raise alarms when the signals reach certain limits or values.

Read more about "[Alarm Monitors](#)" on page 324.

The options in this logical group (the Alarm Configuration options) let you configure all the limits, values, etc. for the system's Alarm Monitors.

Configuration **changes are allowed** at this level, using a Pin-Code.

NOTICE:

The default Service Access Level password or Pin-Code is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

Read about "[Access Levels](#)" on page 323.

The available Alarm Monitors are organized in *system-oriented groups*: Mains, Generator, Rectifier, Load, etc.

Refer to these topics (Mains, Rectifiers, etc.) for more information about the available Alarm Monitors parameters.

Read also the topic "[Typical Parameters for Alarm Monitors](#)" on page 326.

You can display the alarm configuration options using any available computer based GUI, or from the *Smartpack* and the *Smartpack2 Master* controllers' displays.

From the Smartpack2 Master Controller's Front

You can display the following alarm configuration options, via the *Smartpack2 Master* controller's front keys:

3.1 Mains

Available options in *Smartpack2 Master Controller's* submenu:

Alarm Configuration > **Mains**

#	Description	Value	Unit/Label	Note
	MainsFail	☐	Enable	>> to Alarm Monitor configuration N1
	MainsVolt 1	☐	Enable	>> to Alarm Monitor configuration A4

>> Read also the topic “[Typical Parameters for Alarm Monitors](#)” on page 326.

3.2 Rectifiers

Available options in *Smartpack2 Master Controller*’s submenu:

Alarm Configuration > **Rectifiers**

#	Description	Value	Unit/Label	Note
	RectifierCurrent	☐	Enable	>> to Alarm Monitor configuration A2
	RectifierError	☐	Enable	>> to Alarm Monitor configuration N2
	RectComm Error	☐	Enable	>> to Alarm Monitor configuration N2
	Rect. Capacity	☐	Enable	>> to Alarm Monitor configuration N2%
	RectCurrShareErr	☐	Enable	>> to Alarm Monitor configuration N2%
	Rectifier Temp	☐	Enable	>> to Alarm Monitor configuration A4

>> Read also the topic “[Typical Parameters for Alarm Monitors](#)” on page 326.

3.3 Load

Available options in *Smartpack2 Master Controller*’s submenu:

Alarm Configuration > **Load**

#	Description	Value	Unit/Label	Note
	LoadCurrent	☐	Enable	>> to Alarm Monitor configuration A2

>> Read also the topic “[Typical Parameters for Alarm Monitors](#)” on page 326.

3.4 Battery

Available options in *Smartpack2 Master Controller*’s submenu:

Alarm Configuration > **Battery**

#	Description	Value	Unit/Label	Note
	BatteryVoltage	☐	Enable	>> to Alarm Monitor configuration A4
	BatteryCurrent	☐	Enable	>> to Alarm Monitor configuration A4
	BatteryTemp	☐	Enable	>> to Alarm Monitor configuration A4
	BatteryLifeTime	☐	Enable	>> to Alarm Monitor configuration N2
	LVBD	☐	Enable	>> to Alarm Monitor configuration XX
	BatteryQuality	☐	Enable	>> to Alarm Monitor configuration N2%
	BatteryTotCap	☐	Enable	>> to Alarm Monitor configuration N2
	BatteryRemCap	☐	Enable	>> to Alarm Monitor configuration N2%
	BatteryTimeLeft	☐	Enable	>> to Alarm Monitor configuration N2
	DeltaStringCurr	☐	Enable	>> to Alarm Monitor configuration N2%
	BatteryUsedCap	☐	Enable	>> to Alarm Monitor configuration N2%
	BattVolt bank 1	☐	Enable	>> to Alarm Monitor configuration A4
	BattCurr bank 1	☐	Enable	>> to Alarm Monitor configuration A4
	BatteryFuse 1.1	☐	Enable	>> to Alarm Monitor configuration L1
	BatteryFuse 1.2	☐	Enable	>> to Alarm Monitor configuration L1
	BatteryTemp 1.1	☐	Enable	>> to Alarm Monitor configuration A4
	BatteryTemp 1.2	☐	Enable	>> to Alarm Monitor configuration A4

	BatteryTemp 1.6	☐	Enable	>> to Alarm Monitor configuration A4
	BattCurrent 1.1	☐	Enable	>> to Alarm Monitor configuration A4
	BattCurrent 1.2	☐	Enable	>> to Alarm Monitor configuration A4

>> Read also the topic “[Typical Parameters for Alarm Monitors](#)” on page 326.

3.5 Inputs

Available options in *Smartpack2 Master Controller*’s submenu:

Alarm Configuration > **Inputs**

#	Description	Value	Unit/Label	Note
	ProgInput 1.1	☐	Enable	>> to Alarm Monitor configuration L1
	ProgInput 1.1	☐	Enable	>> to Alarm Monitor configuration L1

	ProgInput 1.14	☐	Enable	>> to Alarm Monitor configuration L1
	AC SPD alarm	☐	Enable	>> to Alarm Monitor configuration L1
	Door alarm	☐	Enable	>> to Alarm Monitor configuration L1
	Smoke alarm	☐	Enable	>> to Alarm Monitor configuration L1
	DC SPD alarm	☐	Enable	>> to Alarm Monitor configuration L1
	Heater alarm	☐	Enable	>> to Alarm Monitor configuration L1
	LVD close	☐	Enable	>> to Alarm Monitor configuration L1

>> Read also the topic “[Typical Parameters for Alarm Monitors](#)” on page 326.

3.6 Outputs

Available options in *Smartpack2 Master Controller*’s submenu:

Alarm Configuration > **Outputs**

#	Description	Output	1	2	3	4	5	6	Note
	Alarm Groups								
	Major Alarm	☐	☐	☐	☐	☐	☐	☐	
	Minor Alarm	☐	☐	☐	☐	☐	☐	☐	
	Mains Alarm	☐	☐	☐	☐	☐	☐	☐	
	Alarm Group 4	☐	☐	☐	☐	☐	☐	☐	
	Alarm Group 5	☐	☐	☐	☐	☐	☐	☐	

	Alarm Group 17	☐	☐	☐	☐	☐	☐	☐	
	OutpBlocked	☐	☐	☐	☐	☐	☐	☐	
	LVBD	☐	☐	☐	☐	☐	☐	☐	
	LVLD1	☐	☐	☐	☐	☐	☐	☐	
	-----	☐	☐	☐	☐	☐	☐	☐	
	-----	☐	☐	☐	☐	☐	☐	☐	
	-----	☐	☐	☐	☐	☐	☐	☐	

Refer to topic “[Alarm Output Groups](#)” on page 328.

3.7 Control System

Available options in *Smartpack2 Master Controller*’s submenu:

Alarm Configuration > **CtrlSystem**

#	Description	Value	Unit/Label	Note
	CtrlUnitError SmartPack 255	☐	Enable	>> to Alarm Monitor configuration N2
	BatteryTemp 1.1	☐	Enable	>> to Alarm Monitor configuration A4
	BatteryTemp 1.2	☐	Enable	>> to Alarm Monitor configuration A4

	BatteryTemp 1.6	☐	Enable	>> to Alarm Monitor configuration A4
	CtrlUnitError BatteryMonitor	☐	Enable	>> to Alarm Monitor configuration N2

CtrlUnitError LoadMonitor	☐	Enable	>> to Alarm Monitor configuration N2
CtrlUnitError I/O Unit	☐	Enable	>> to Alarm Monitor configuration N2

>> Read also the topic "[Typical Parameters for Alarm Monitors](#)" on page 326.

3.8 Generator

Available options in *Smartpack2 Master Controller*'s submenu:

Alarm Configuration > **Generator**

#	Description	Value	Unit/Label	Note
	GeneratorFail	☐	Enable	>> to Alarm Monitor configuration L1

>> Read also the topic "[Typical Parameters for Alarm Monitors](#)" on page 326.

3.9 Solar Converter

Available options in *Smartpack2 Master Controller*'s submenu:

Alarm Configuration > **SolarConv**

#	Description	Value	Unit/Label	Note
	SolarCurrent	☐	Enable	>> to Alarm Monitor configuration A2
	SolarChargerErr	☐	Enable	>> to Alarm Monitor configuration N2
	SolarCommErr	☐	Enable	>> to Alarm Monitor configuration N2
	Solar Capacity	☐	Enable	>> to Alarm Monitor configuration N2
	SolarSymmetrErr	☐	Enable	>> to Alarm Monitor configuration N2
	SolarCharg temp	☐	Enable	>> to Alarm Monitor configuration A4

>> Read also the topic "[Typical Parameters for Alarm Monitors](#)" on page 326.

Commands options

The options in this logical group let you issue or activate specific commands, such as resetting manual alarms, deleting the event log, starting battery tests, etc.

Issuing **commands** is **allowed** at this level, using a Pin-Code.

NOTICE:

The default Service Access Level password or Pin-Code is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

Read about "[Access Levels](#)" on page 323.

The commands are organized in following groups:

- **System Commands**
Read about "[System Commands](#)" on page 217
- **Battery Commands**
Read about "[Battery Commands](#)" on page 296
- **Outputs Test**
Read about "[Output Test Commands](#)" on page 330

Logs and Reports options

The options in this logical group collect and present the system log, battery log, report of active alarms, etc.

The logs and reports are organized in following groups:

- Active Alarm Log
- Event Log
- Battery Test Log
- Inventory Report

Active Alarms Log

You can browse through the stored system alarm messages (or alarm log). The controller's alarm log may store up to 1000 chronological events. Each log entry contains event text, event action, time and date. When the log is full, the oldest value is overwritten. The log is stored in EEPROM.

Example of alarm log in *Smartpack2 Master Controller's* submenu:

Logs/Report > Active Alarms

#	Description	Value	Limit	Alarm Group	Output	Note
	BatteryTemp 1.1	42	30	----	---	
	SymmVolt 1.1	12,91	1,50	Alarm Group 15	----	
	RectifierError	1	1	Minot Alarm	-----	

Read about "[Alarm Messages, \(Log\)](#)" on page 241.

Event Log

The Event Log is a record of system related events automatically registered by the system controller.

Example of Event Log in *Smartpack2 Master Controller's* submenu:

Logs/Report > Event Log

#	Date and Time	Description	Event	Note
	yyyy.mm.dd hh:mm:ss	RectifierError	MinorAl:On	
	yyyy.mm.dd hh:mm:ss	SymmVolt 1.4	MajorAl:On	
	yyyy.mm.dd hh:mm:ss	LVD close	Info:On	
	yyyy.mm.dd hh:mm:ss	Door alarm	MajorAl:Off	
	yyyy.mm.dd hh:mm:ss	OutdoorTemp 81.1	Info:Off	

You can also save the Even Log to a storage media -- read about "[Up/Download options](#)" on page 196 -- or use *WebPower* or *PowerSuite* to delete, print and save the log to a file in your computer.

Read about "[Types of System Logs](#)" on page 230.

Battery Test Log

The Battery Test Log is displayed in a results table; each row of data represents a battery test. Also, the battery quality, calculated by completed battery tests, and other test parameters are displayed.

Example of Battery Test Log table displayed in *Smartpack2 Master Controller's* submenu:

[illegible]

Using *WebPower* or *PowerSuite* you can also display the test results for a battery test in a line graph.

The Inventory Report presents information that describe the power system, the site's name , serial number, installation and service dates, software name, etc.

Logs/Report > **Inventory Report**

#	Description	Note
	Company	
	Site	
	Model	
	Install Date	
	Serial N	
	Service Date	
	Responsible	
	Message 1	
	Message 2	
	(Installed HW and SW info, part #, serial #, version #, etc.)	

Statistics options

This logical group collects and presents relevant system data and calculated statistics, such as average results, peak values, etc.

Example of the Statistics table available in *Smartpack2 Master Controller's* submenu:

#	Description	Reset	Average	Peak	Note
	BatteryVoltage	☐ No	52,48	52,61	
	BatteryCurrent	☐ No	-35	0	
	Battery Temp	☐ No	41	0	
	Load Current	☐ No	35	50	
	Rectifier Current	☐ No	75	120	
	Mains Volt 1	☐ No	225	235	

This logical group presents a generic description of the steps required to carry out the power system's commissioning.

Refer also to the system's user documentation, and to the Commissioning Procedure pull-out list in the system's quick start guide.

Up/Download options

The options in this logical group let you upload **firmware** to connected controllers and control units, as well as download or save **system related logs**, etc.

In addition to firmware, this group's options offer you the possibility of uploading and saving system **configuration files**.

NOTICE:

Using the controller's front panel keypad, you can only upload & download to the controller's SD card. Using the *WebPower* or *PowerSuite* GUI, you can also upload & download to other storage media, such as a computer's hard drive or similar.

The Up- and Download options are organized in following groups:

- **Save Event Log**
A command that saves to a storage media the system related log of power system events, automatically registered by the system controller. Read about "[Logs and Reports options](#)" on page 194, or about "[Types of System Logs](#)" on page 230
- **Save Data Log**
A command that saves to a storage media the control unit related log of key system data (voltages, current and temperature values) registered by the system controllers, or by other connected control units (e.g. I/O Monitor, Mains Monitor).
Read about "[Types of System Logs](#)" on page 230
- **Save Energy Log**
A command that saves to a storage media the system related log that presents the power system's energy usage, (Wh).
Read about "[Types of System Logs](#)" on page 230
- **Save /Load Config**
A command that saves to a storage media the System Configuration file <*.XML>, with all the specific parameters and settings.
Also, you can upload a similar, specific System Configuration file <*.XML> to the controller, e.g. for automatic configuration of specific functions
- **Software Upgrade**
which offers you to upgrade the firmware in connected controllers and control units, by uploading files stored in the *Smartpack2 Master* controller's SD card.

Available options in *Smartpack2 Master* Controller's submenu:

Up/Download > Software Upgrade

#	Description	SW Info		Note
	Compack 11	405006.009	0A.M	
	Smartpack1	402073.009	3.05E	
	I/O Unit 1	402088.009	3.01	

Read also about other firmware upgrade methods in topic "[Firmware Upgrade](#)" on page 331.

Power System Functions

This section explains general topics related to the DC power supply system.

Networking the Controller - Access Methods

This topic describes how to access the power system main controller from a computer, so that you can configure and operate the DC power supply system.

You can access the controller using a standard computer, which is either connected to an existing LAN or directly connected to the controller.



(Example of *Compack* controller access via LAN and via a stand-alone computer)

After accessing the controller, you can read a short description about available methods to configure and monitor the DC power supply system, which you find in topic "[Power System Configuration & Monitoring – Methods](#)" on page 206.

Controller's Default IP Address

Each main controller is shipped with a **unique Eltek MAC address** (Media Access Control) stored inside the controller and marked on the controller's label, e.g. [00-0A-19-C0-00-13].

Also, the controllers are by default shipped with the **fixed, static IP address** <192.168.10.20>.

WARNING:

Some controllers may have the Dynamic Host Configuration Protocol (DHCP) enabled, instead of static IP address. Thus, they can automatically obtain necessary access data to operate in an existing Local Area Network (LAN), based on the Ethernet communication technique and the TCP/IP protocol suite.

NOTICE:

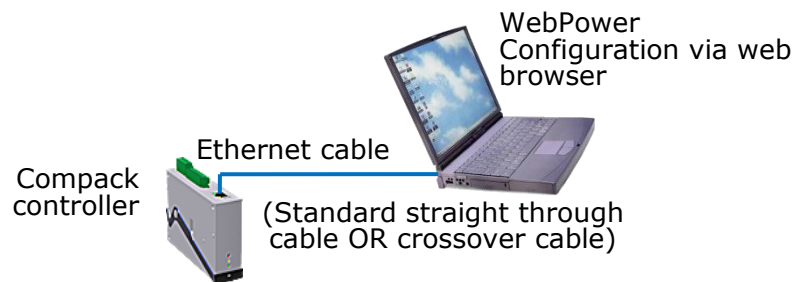
In short, two LAN devices (e.g. a controller and a computer) can communicate with each other, if they have different IP addresses and are in the same subnet.

A Subnet Mask is used to determine what subnet an IP address or device belongs to.

For example, all devices with IP address <169.254.52.XXX> and subnet mask <255.255.255.0> (where XXX can be 1 to 255) belong to the same subnet, and can "talk" to each other.

Controller Access -- Via Stand-alone PC

You can also access the power system controller directly from a stand-alone computer.



(Example of *Compack* controller access via stand-alone PC)

**NOTICE:

You need an Ethernet crossover cable, if the controller is a *Smartpack* with hardware version 1.x (SB70) or previous.

Contact your IT Department, if your computer has difficulties while installing or configuring the network card.

Requirements

- Computer equipped with a standard Ethernet Network Interface Card (NIC) with RJ-45 socket. Wireless NICs may not be used to access the controller.
- The NIC's necessary network components have to be correctly installed, specially the Internet Protocol (TCP/IP). Also, the DHCP function must be enabled.
- Ethernet cable to connect the controller to the LAN (straight-through** or crossover cable, as the controller's port implements HP Auto MDI/MDI-X detection and correction)
- “*Eltek Network Utility*” program, that you can download with the controller's firmware from www.eltek.com

**NOTICE:

You need an Ethernet crossover cable, if the controller is a *Smartpack* with hardware version 1.x (SB70) or previous.

Network components are software clients, services and protocols that the NIC uses to communicate with servers in the network.

In Short

To get access to the controller via a stand-alone computer, just connect the controller directly to the computer's NIC, using a standard Ethernet straight-through** or crossover cable.

NOTICE:

By default, the controllers are shipped with a unique MAC address, e.g.

[00-0A-19-C0-00-13] and a fixed, static IP address <192.168.10.20>. Some controllers may have DHCP enabled (automatically obtain necessary access data to operate in an existing LAN).

For the computer to be able to access the controller, both devices need to have different IP addresses, but in the same subnet. If the computer's NIC IP address is e.g. <169.254.52.132>, so changing the controller's IP address from <192.168.10.20> to e.g. <169.254.52.133> will enable them to "talk" to each other.

NOTICE:

If the controller has DHCP enabled when you connect it to the computer's NIC, then the controller and the computer will assign themselves a random IP address, e.g. the controller may get <0.0.0.1> and the computer <169.254.52.132>. In this case, change the controller's IP address from e.g. <0.0.0.1> to e.g. <169.254.52.133> to enable them to "talk" to each other.

Then, access the controller via your web browser, and change its LAN device name, to facilitate later identification.

The "Controller Access — Via Stand-alone PC" procedure involves following steps (as described in more detail in the topic "[More Detailed](#)" on page 199):

1. Start the "*Eltek Network Utility*" program
2. Connect the computer to the controller and check its MAC address
3. Find the NIC's IP address and subnet mask used by the computer
4. Change the controller's IP address to the same subnet as the computer's
5. Access the controller's configuration pages in your web browser
6. Log in with the <admin> account,
7. Change the controller's Device Name

****NOTICE:**

You need an Ethernet crossover cable, if the controller is a *Smartpack* with hardware version 1.x (SB70) or previous.

More Detailed

Carry out the following steps to access the controller via a stand-alone computer:

1. **Start the "*Eltek Network Utility*" program**
by opening the file "EVIPSetup.exe", which will not display any LAN devices, as the computer has now nothing connected to the NIC.

Notice that if the computer has installed wireless Ethernet Network Interface Cards, they should not be active; otherwise the *Eltek Network Utility* may display LAN devices accessed wireless.

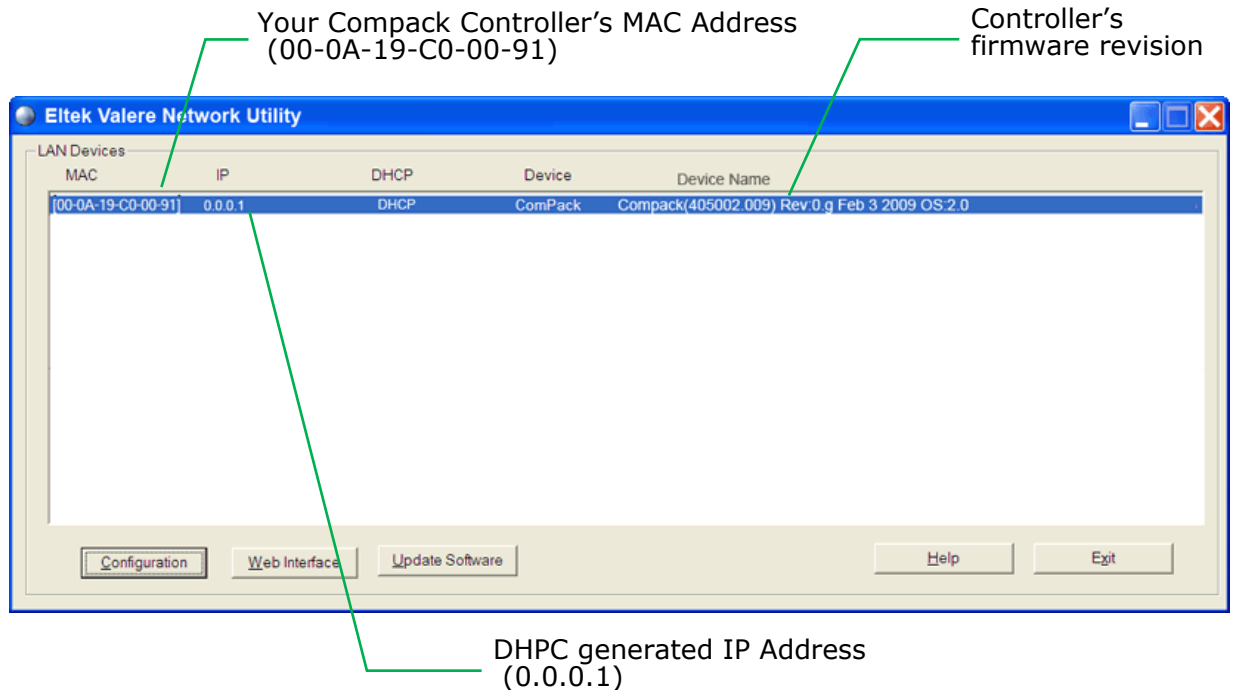
2. Connect the computer to the controller and check its MAC address

plugging one end of the Ethernet cable to the controller's RJ-45 socket, and the other end to the computer's NIC.

The *Eltek Network Utility* displays the controller as a connected LAN device (may take up to 1 minute to display) with the default static IP address <192.168.10.20>

Notice that -- if the controller has the DHCP enabled instead of static IP address -- the controller automatically gets an IP address, e.g. <0.0.0.1>, as displayed in the *Eltek Network Utility* below.

Check that the displayed MAC address corresponds to the MAC address label on the controller.



(Example of Compack controller's data)

3. Find the NIC's IP address and subnet mask used by the computer by,

- Opening the computer's Network Connections window
- Selecting the actual network card (NIC) and
- Making a note of the IP address and Subnet mask displayed in the Details panel, on the left side of the window.
E.g. IP address: <169.254.52.132>, Subnet mask: <255.255.0.0>

Read the topic [How to Check or Change the Computer's IP Address](#) (page 382) in the FAQs section

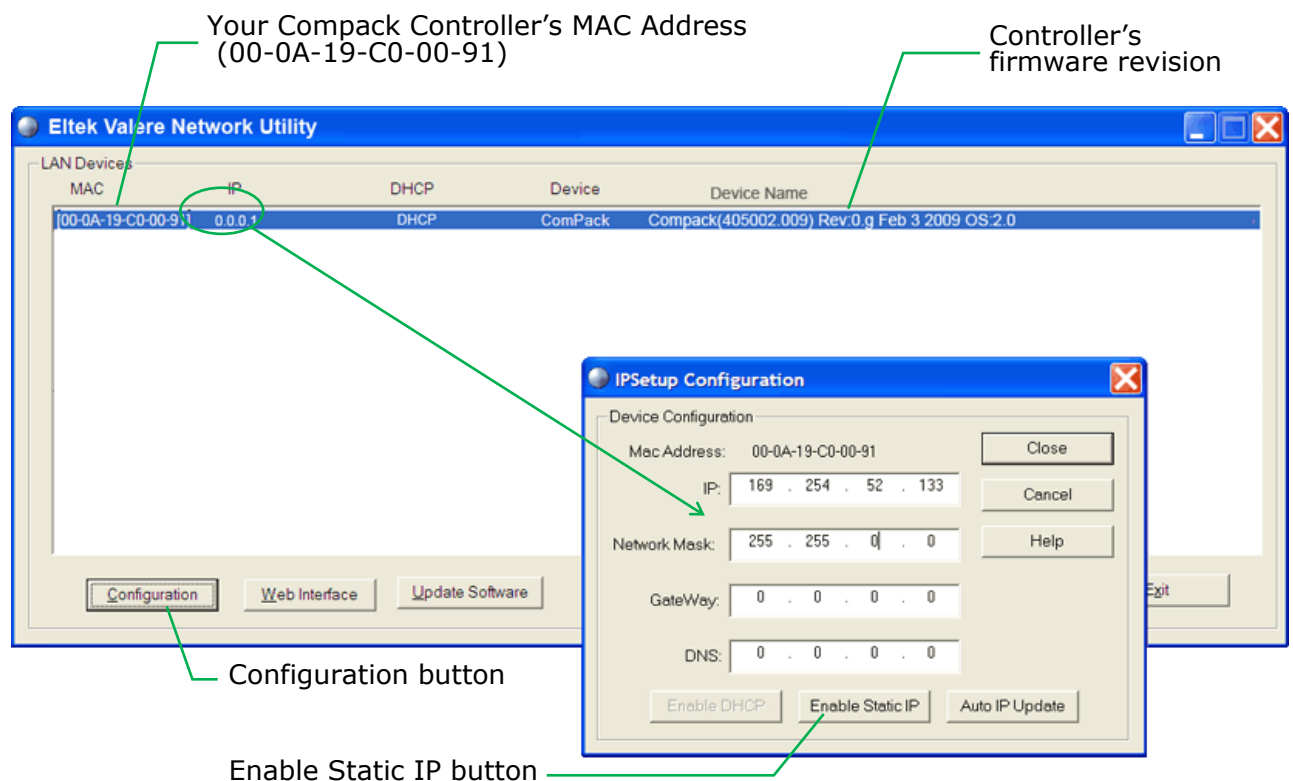
Notice that you can also get this information by opening a DOS window and running the command "IPCONFIG".

4. **Change the controller's IP address to the same subnet as the computer's by,**
 - Selecting the controller in the *Elitek Network Utility* window
 - Clicking on the Configuration button, to open the "IPSetup Configuration" window
 - Changing the default static IP address <192.168.10.20> to e.g. <169.254.52.133>
OR from, e.g. <0.0.0.1> to e.g. <169.254.52.133>, if DHCP was enabled, as shown below.
- Notice that the IP address you assign the controller must not be used by other devices.
- Changing the Network Mask from, e.g. <0.0.0.0> to e.g. <255.255.0.0>
 - and clicking on the "Enable Static IP" button.

Now, the controller's and the computer's IP addresses are in the same subnet and both devices can "talk" to each other.

Computer's: <169.254.52.132> <255.255.0.0>

Controller's: <169.254.52.133> <255.255.0.0>



(Example of controller's data)

WARNING!

Never enter Network Mask (Subnet masks) <0.0.0.0> or <255.255.255.255> as they are not valid masks, and in the worst case may render the controller or LAN device inaccessible.

5. **Access the controller's configuration pages in your web browser**
by opening your web browser (e.g. Internet Explorer) and entering the controller's new static IP address in the browser's address line.
(E.g. <169.254.52.133>; entering "http://" before the address is not necessary)

6. Log in with the <admin> account,

by clicking on the “Enter” link — in the web browser, in the middle of the page — and entering <admin> as user name and <admin> as password (case sensitive).

Note that the web browser must have the Pop-ups function enabled, as the configuration web pages employ Java script navigation. Read topic [How to Enable Pop-ups in the browser -- Internet Explorer](#) (page 374) in the FAQs section

For security reasons, it is advisable to change the default passwords with your own passwords.

Read the topic [How to Change WebPower’s Default Log in Passwords](#) (page 375) in the FAQs section

7. Change the controller’s Device Name by,

(In SP2WebGUI)

— Clicking on “System Config” icon, in the toolbar

— Clicking on “Network Settings” in the command tree on the left, under Device Settings

— Then clicking in the Device Name field and entering the Device Name that describes your power system, e.g. “Micropack System, EV Engine Room, Oslo”

(In WebPower 3 GUI)

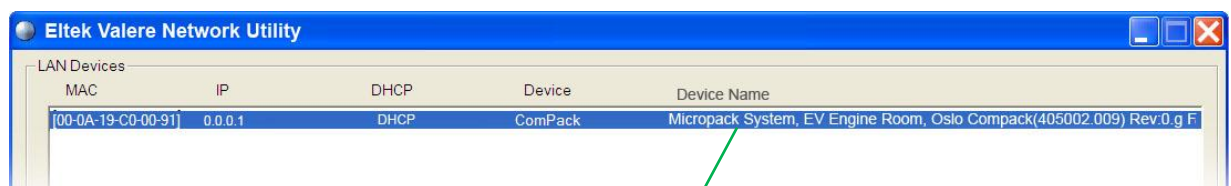
— Clicking on “Network Config” button, in the Power Explorer’s toolbar

— Clicking on the “TCP/IP” tab

— Then clicking in the Device Name field and entering the Device Name that describes your power system, e.g. “Micropack System, EV Engine Room, Oslo”

Read topic [How to Change the Controller’s Device Name](#) (page 380) in the FAQs section

Now the *Eltek Network Utility* window will display the new device name.



Eltek Valere Network Utility				
LAN Devices				
MAC	IP	DHCP	Device	Device Name
00-0A-19-C0-00-91	0.0.0.1	DHCP	ComPack	Micropack System, EV Engine Room, Oslo Compack(405002.009) Rev.0.g F

Changed Compack Controller’s Device Name
(Micropack System, EV Engine Room, Oslo)

(Example of Compack
controller’s data)

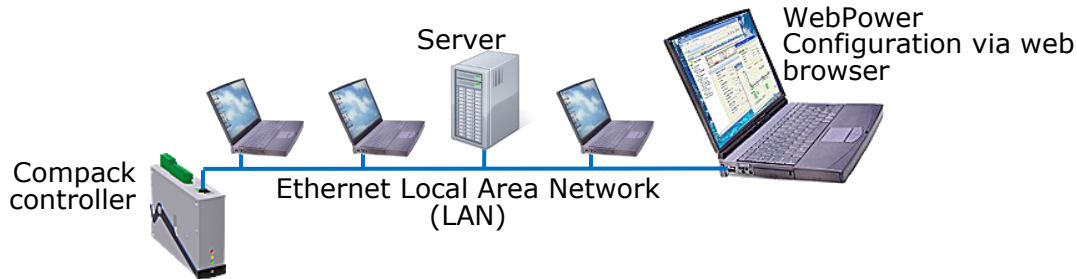
NOTICE:

If later you connect your computer’s NIC (while DHCP is enabled) to a LAN, the network server will automatically assign a new IP address to your NIC, so that your computer may access the LAN.

It may take up 1 or 2 minutes, but you can select the command “Repair this connection” — in the computer’s Network Connections window — and Windows will right away automatically assign the new IP address.

Controller Access -- Via Ethernet LAN

If you have access to a Local Area Network (LAN) -- based on the Ethernet communication technique and the TCP/IP protocol suite -- you can simply connect the controller to the LAN, and get web browser access to the controller from your networked computer.



(Example of *Compact* controller access via LAN)

Contact your LAN administrator, if your computer has difficulties accessing the network.

Requirements

- Computer correctly configured and connected to the LAN
- Standard Ethernet cable (straight through cable), to connect the controller to the LAN
- “*Etek Network Utility*” program, that you can download with the controller’s firmware from www.eltek.com

In Short

To get access to the controller via your LAN networked computer just connect the controller to the LAN using a standard Ethernet straight-through** or crossover cable.

NOTICE:

By default, the controllers are shipped with a unique MAC address, e.g. [00-0A-19-C0-00-13] and a fixed, static IP address <192.168.10.20>. Some controllers may have DHCP enabled (automatically obtain necessary access data to operate in an existing LAN).

For the computer to be able to access the controller via the LAN network, both devices need to have different IP addresses, but in the same LAN subnet. If the networked computer’s NIC IP address is e.g. <172.16.5.29>, so changing the controller’s IP address from <192.168.10.20> to e.g. <172.16.5.30> will enable them to “talk” to each other via the LAN network.

NOTICE:

If the controller has DHCP enabled when you connect it to the LAN network, then the LAN network will automatically assign the controller with a spare IP address in the LAN subnet, e.g. the controller may get <172.16.6.130>, which will enable the networked computer to “talk” to controller.

Using the “*Eltek Network Utility*” program, identify the controller, access it via your web browser and change the controller’s LAN device name, to facilitate later identification.

The “Controller Access -- Via Ethernet LAN” procedure involves following steps (as described in more detail in topic “[More Detailed](#)” on page 204):

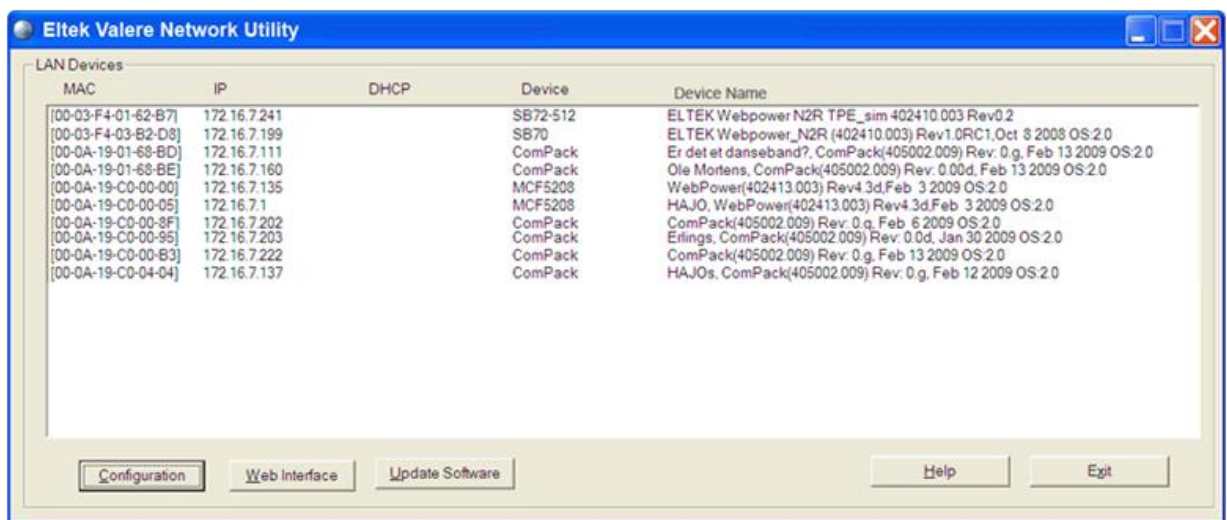
1. Start the “*Eltek Network Utility*” program
2. Connect the controller to the LAN
3. Identify the controller in the “*Eltek Network Utility*” program, and change the controller’s IP address to be in the LAN subnet
4. Access the controller’s configuration pages in your web browser
5. Log in with the <admin> account
6. Change the controller’s Device Name

Read also topic “[Controller’s Default IP Address](#)” on page 197.

More Detailed

Carry out the following steps to access the controller via the Ethernet LAN:

1. **Start the “*Eltek Network Utility*” program**
by opening the file “EVIPSetup.exe”, which will display already connected LAN devices. The controller will be displayed after connection to the LAN.



(Example of connected LAN devices)

Notice that if the computer has installed wireless Ethernet Network Interface Cards, they should not be active; otherwise the *Eltek Network Utility* may display LAN devices accessed wireless.

2. **Connect the controller to the LAN**
plugging one end of a standard Ethernet cable (straight through Ethernet cable) to the controller’s RJ-45 socket, and the other end to one of the LAN’s available RJ-45 sockets.

3. In the “*Eltek Network Utility*”, identify the controller and change its IP address

The utility program displays the controller as a connected LAN device with its unique MAC address and the default static IP address <192.168.10.20>

Note that it can take up to 1 minute before the connected controller is displayed in the utility program. Read also topic “[Controller’s Default IP Address](#)” on page 197.

Then, change the controller’s IP address to be in the LAN subnet by

- Selecting the controller in the *Eltek Network Utility* window
- Clicking on the Configuration button, to open the “IPSetup Configuration” window
- Changing the default static IP address <192.168.10.20> to e.g. <172.16.5.30>, if the networked computer’s NIC IP address is e.g. <172.16.5.29>

Notice that the IP address you assign the controller must not be used by other devices.

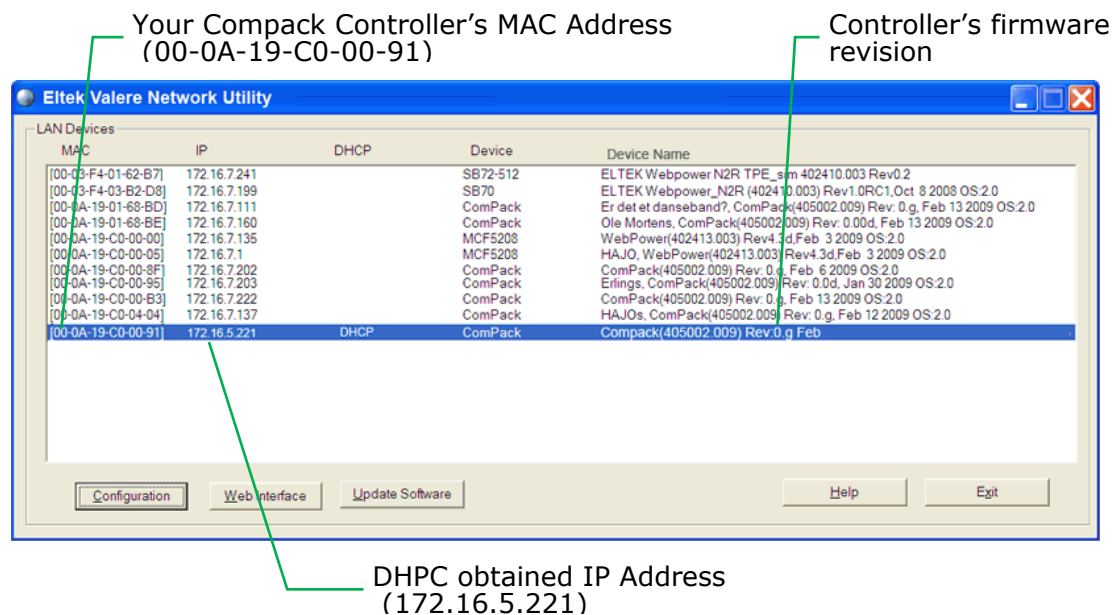
- Changing the Network Mask from, e.g. <0.0.0.0> to e.g. <255.255.0.0>
- and clicking on the “Enable Static IP” button.

Now, the controller’s and the computer’s IP addresses are in the same LAN subnet and both devices can “talk” to each other via the LAN network.

Computer’s: <172.16.5.29> <255.255.0.0>

Controller’s: <172.16.5.30> <255.255.0.0>

Notice that you do not have to change the controller’s IP address -- if the controller has the DHCP enabled instead of static IP address. The controller then automatically gets an IP address from the LAN, e.g. <172.16.5.221>, as displayed in the *Eltek Network Utility* below.



(Example of Compack controller’s data)

4. Access the controller’s configuration pages in your web browser

by marking the controller (blue marking line in the above example), and clicking on the Web Interface button.

or
by opening your web browser (e.g. Internet Explorer) and entering the controller’s IP address in the browser’s address line.

(E.g. <172.16.5.221>; entering “http://” before the address is not necessary)

5. Log in with the <admin> account,

by clicking on the “Enter” link -- in the web browser, in the middle of the page -- and entering <admin> as user name and <admin> as password (case sensitive).

Note that the web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation. Read topic [How to Enable Pop-ups in the browser -- Internet Explorer](#) (page 374) in the FAQs section

For security reasons, it is advisable to change the default passwords with your own passwords.

Read the topic [How to Change WebPower’s Default Log in Passwords](#) (page 375) in the FAQs section

6. Change the controller’s Device Name by,

(In SP2WebGUI)

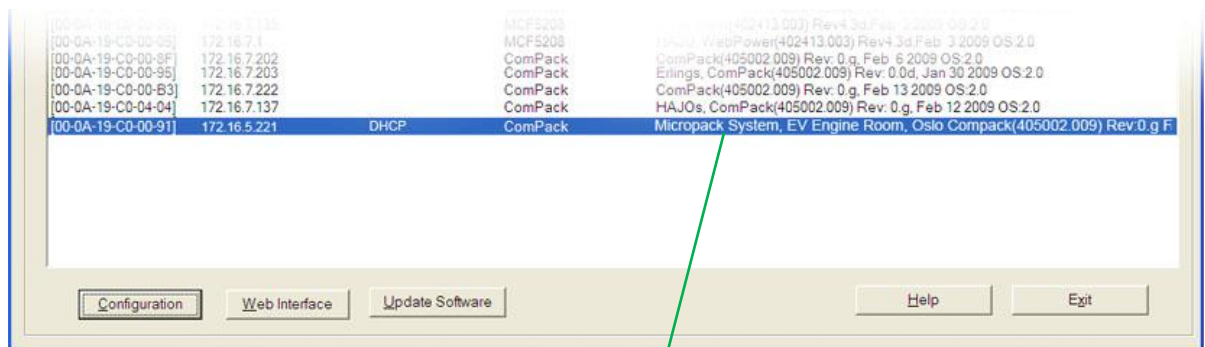
- Clicking on “System Config” icon, in the toolbar
- Clicking on “Network Settings” in the command tree on the left, under Device Settings
- Then clicking in the Device Name field and entering the Device Name that describes your power system, e.g. “Micropack System, EV Engine Room, Oslo”

(In WebPower 3 GUI)

- Clicking on “Network Config” button, in the Power Explorer’s toolbar
- Clicking on the “TCP/IP” tab
- Then clicking in the Device Name field and entering the Device Name that describes your DC power system, e.g. “Micropack System, EV Engine Room, Oslo”

Read topic [How to Change the Controller’s Device Name](#) (page 380) in the FAQs section

Now the *Eltek Network Utility* window will display the new device name.



Changed Compack Controller’s Device Name
(Micropack System, EV Engine Room, Oslo)

(Example of Compack
controller’s data)

Power System Configuration & Monitoring – Methods

This topic describes the available methods to configure and monitor the DC power supply system from a computer.

Before configuring and monitoring the power system, the computer must be able to access the controller, which is described in topic “[Networking the Controller - Access Methods](#)” on page 197.

You can configure and monitor the DC power supply system from a computer — connected to a LAN or directly connected to the controller — using the following methods:

- **Via a standard web browser.**

The configuration Web pages are stored in the controller, so you do not need to install any programs in the computer. They enable useful monitoring and configuration features.

For more information about how to access the configuration web pages, read topic [How to Change WebPower's Default Log in Passwords](#) (page 375) in the FAQs section

- **Via PowerSuite application.**

The powerful *PowerSuite* application must be installed in the computer, and enables advanced monitoring and configuration features.

For more information read topics [Installing PowerSuite](#) (page 4) and [Installing PowerSuite \(Ethernet\)](#) (page 8) in the *PowerSuite Help* file.

- **Via Network Management System (NMS)**

The NMS hardware and software must be installed in the network.

For more information, read topic “[Monitoring -- via Network Management System](#)” on page 207

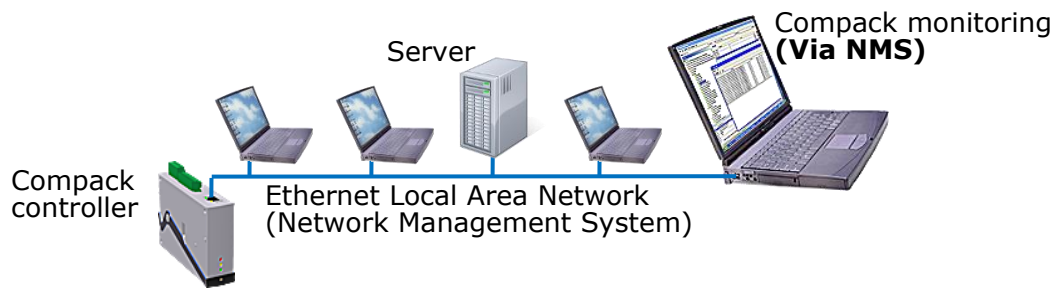


(Example of power system configuration and monitoring via Web browser, *PowerSuite* and NMS)

Monitoring -- via Network Management System

You can remote monitor the DC power supply system from a computer connected to an Ethernet LAN which has installed a Network Management System (NMS).

The NMS hardware and software must be previously installed in the LAN network.



(Example of power system remote monitoring via NMS)

Requirements

- Computer correctly configured, connected to the LAN and with access to the NMS
- Standard Ethernet cable (straight through cable), to connect the controller to the LAN
- Eltek's specific SNMP MIB files (Management Information Base)

Contact your IT Department, if your computer has difficulties while installing the MIB files or accessing the SNMP agent (Simple Network Management Protocol).

In Short

The power system's controllers implement an SNMP agent which interfaces with the Network Management System (NMS), enabling remote monitoring via the standard SNMP messaging commands SET, GET and TRAP.

The SNMP agent is compatible with all major NMS on Ethernet, such as "HP Open View", "Sun NetManager", etc.

The SNMP agent responds to SNMP's GET and SET commands, and forwards TRAPs to designated recipients when critical conditions occur to the DC power system, as configured in the controller.

The GET commands provide the NMS with remote monitoring status — e.g. Battery status, etc. — of the power system.

The SET commands enable the NMS to remote control the power system, e.g. changing the output voltage.

The TRAP commands are unsolicited alarm messages that the power system sends to the NMS, when critical situations occur.

You can regard SNMP agents (network devices) that send TRAPs as "clients", and network devices that receive TRAPs and poll devices (issue GETs and SETs) as "servers".

The "Monitoring — via Network Management System" procedure involves following steps:

Controller's SNMP configuration:

1. TRAP receiver IP addresses
(Network Managers that receive alarm messages)

2. TRAP Community Strings
3. TRAP Repeat Rates
4. Read and Write Community Strings

Refer to topic “[More Detailed - Controller SNMP Configuration](#)” on page 209.

NMS configuration:

1. Compile the Eltek’s device specific MIB files into the NMS database (Read chapter “[About Eltek’s SNMP MIB Files](#)”, page 212)
2. Add the controller object to the Management Map (See an example of the *Compack* controller object added to the Management Map, in chapter “[Example -- NMS Configuration](#)”, page 213.)
3. “Ping” the controller to ensure connectivity
4. Define and configure the TRAP event handling, as required

Refer to the NMS manuals for accurate instructions.

More Detailed - Controller SNMP Configuration

Carry out the following steps to configure the controller’s SNMP agent:

1. **Access the controller’s configuration pages in your web browser**
by opening your web browser (e.g. Internet Explorer) and entering the controller’s IP address in the browser’s address line.
(E.g. <172.16.5.75>; entering “http://” before the address is not necessary)
2. **Log in with the <admin> account,**
by clicking on the “Enter” link — in the web browser, in the middle of the page — and entering <admin> as user name and <admin> as password. (case sensitive)
Refer also to the log in procedure in topic [How to Change WebPower’s Default Log in Passwords](#) (page 375) in the FAQs section.

Note that the web browser must have the Pop-ups function enabled, as the configuration web pages employ Java script navigation. Read topic [How to Enable Pop-ups in the browser -- Internet Explorer](#) (page 374) in the FAQs section.

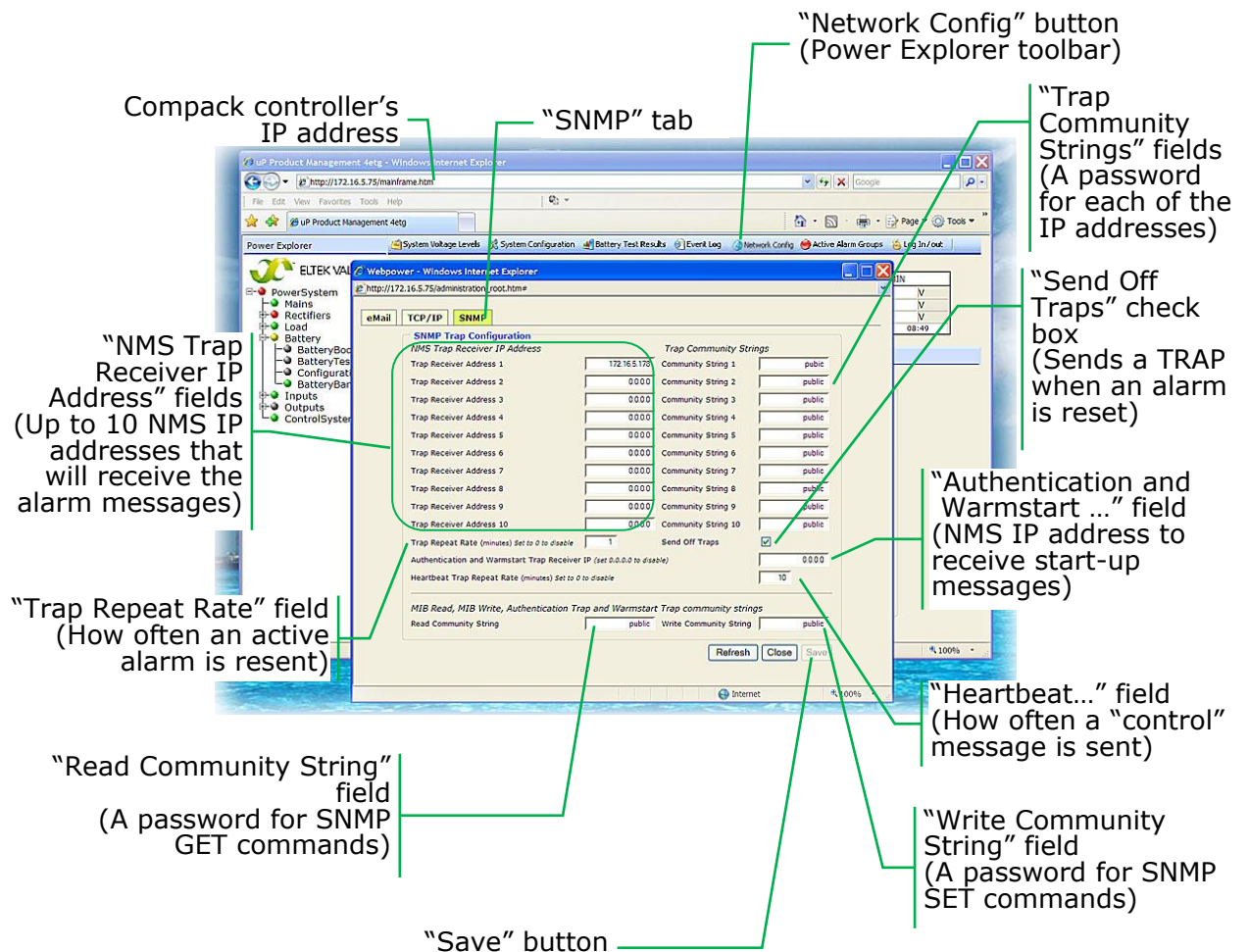
3. Configure the controller's SNMP agent by,

(In SP2WebGUI)

- Clicking on “System Config” icon, in the toolbar
- Clicking on “Network Settings”, then on “SNMP” in the command tree on the left
- Entering the SNMP agent's data in appropriate fields

(In WebPower 3 GUI, as shown below)

- Clicking on the “Network Config” button, on the Power Explorer toolbar
- Clicking on the “SNMP” tab, in the dialog box
- Entering the SNMP agent's data in appropriate fields, as described below
- Then clicking on the “Save” button, to activate the SNMP data



(Example of Compack controller's configuration pages)

“NMS Trap Receiver IP Address” fields:

Enter the NMS IP addresses of up to 10 TRAP hosts.

When critical situations occur in the power system, the controller's SNMP agent can unsolicited send alarm messages to up to 10 different NMS IP addresses (TRAP hosts or managers).

“Trap Community Strings” fields:

Enter a password for each of the 10 TRAP receivers or hosts. Default password is “public” (case sensitive). The password entered here for each TRAP receiver, is also to be entered in the NMS TRAP Receiver List.

Notice:

Community Strings or passwords can be max 19 characters long. Valid characters are A-Z, a-z, 0-9 and special characters ~@#%^&_-=:;, . Do not use any other characters.

“Trap Repeat Rate” field:

Enter how often (number of minutes 0-10) the TRAP message will be resent to the receiver, while the event or alarm remains in active condition. Enter “0” not to resend.

“Send Off Traps” check box:

Check the box to enable sending a TRAP message when an event or alarm is reset to normal condition. Uncheck the box to disable this function.

“Authentication and Warmstart Trap Receiver IP” field:

Enter NMS IP address (TRAP host or manager) that will receive start-up TRAP messages.

“Heartbeat Trap Repeat Rate” field:

Enter how often (number of minutes 0-10) the “heartbeat”, control TRAP message, will be resent to the receiver. Enter “0” to disable sending “heartbeat” messages.

“Read Community String” field:

Enter a password for the SNMP agent’s Read access level. Default password is “public” (case sensitive). Network devices issuing the SNMP GET command must be configured with this password.

Notice:

Community Strings or passwords can be max 19 characters long. Valid characters are A-Z, a-z, 0-9 and special characters ~@#%^&_-=:;, . Do not use any other characters.

“Write Community String” field:

Enter a password for the SNMP agent’s Write access level. Default password is “public” (case sensitive). Network devices issuing the SNMP SET command must be configured with this password.

About Community Strings

You can regard SNMP agents (network devices) that send TRAPs as “clients”, and network devices that receive TRAPs and poll devices (issue GETs and SETs) as “servers”.

The Community String is like a password that the “server” device issues to the “client” device during a remote query (e.g. a GET or SET command). Both the “server” and “client” devices have to use the same password.

Most network devices implement different levels of SNMP access (e.g. Read, Write, etc.) each with its password or community string.

About Eltek's SNMP MIB Files

The *Eltek's* device specific MIB files (Management Information Base) contain device description data, which is used by other SNMP requester devices in the Network Management System (NMS).

NOTICE:
You can visit www.eltek.com to download *Eltek's* device specific MIB files, or contact Eltek's Service Dep.

The MIB files are in the plain-text, DOS End-of-Line format, and conform to the ASN1 coding syntax.

Eltek's SNMP compliant devices are described in one or several MIB files, which are required for configuration of the Network Management System (NMS).

There are 3 types of *Eltek* SNMP MIB files:

- The “**First-Time Installation Type**” MIB files.
Describe a complete MIB tree structure (root and a branch) for *Eltek* SNMP devices.
Use this type of MIB file if your NMS MIB tree does NOT already contain an *Eltek* SNMP MIB tree structure.
- The “**Root Type**” MIB files.
Describe the *Eltek* MIB tree base or root (no branches for SNMP devices).
Use this type of MIB file if you want to use several *Eltek* Branch MIB files simultaneously as branches in the NMS MIB tree.
- The “**Branch Type**” MIB files.
Describe the *Eltek* MIB tree branches for SNMP devices (no root).
Use this type of MIB file if you already have the *Eltek* MIB tree root compiled in the NMS MIB tree.
You can compile several *Eltek* Branch MIB files in the NMS MIB tree, thus describing different *Eltek's* SNMP compliant devices (equipment).

Following table is an overview of some of the *Eltek* SNMP MIB files, their MIB file type and the equipment they describe:

MIB File Type	MIB File Name	Described Eltek Equipment
Root	Eltek_Root.MIB	Top file for all Eltek Branch SNMP MIB files in the NMS
Branch	EltekDistributedPowerPlantV2_branch9.MIB	Smartpack controller with embedded WebPower with firmware version 4.0
Branch	EltekDistributedPowerPlantV3_branch9.MIB	Smartpack controller with embedded WebPower with firmware version 4.1 and 4.2
Branch	EltekDistributedPowerPlantV4_branch9.MIB	Smartpack controller with embedded WebPower with firmware version 4.3, and Compack controller with firmware version 1.0
First Installation	EltekDistributedPowerPlantV3.MIB	Complete Root and Branch file for Smartpack controller with embedded WebPower with firmware version 4.1 and 4.2
First Installation	EltekDistributedPowerPlantV4.MIB	Complete Root and Branch file for Smartpack controller with embedded WebPower with firmware version 4.3, and Compack controller with firmware version 1.0

Example -- NMS Configuration

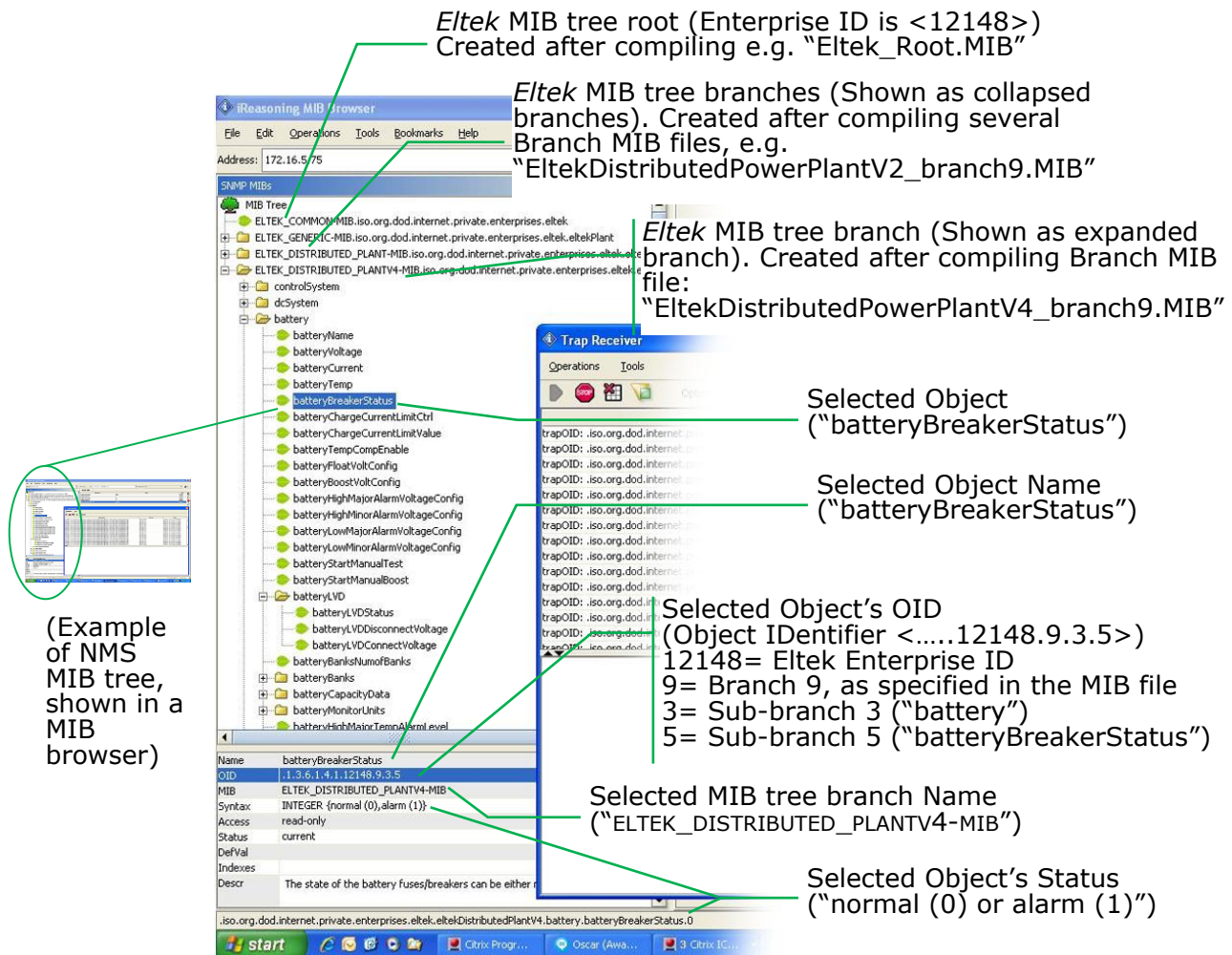
After completing the controller's SNMP configuration — see chapter “[More Detailed - Controller SNMP Configuration](#)”, page 209 — you have to configure your NMS, to complete the “Monitoring — via Network Management System” procedure.

Refer to your NMS manuals for accurate instructions about how to configure the NMS (e.g. “HP Open View”, “Sun NetManager”, etc.)

Follow these general steps to configure the Network Management System:

1. Compile the *Eltek*'s device specific MIB files into the NMS database. Any suitable SNMP based NMS with MIB compiler may be used. (Read also chapter “[About Eltek's SNMP MIB Files](#)”, page 212)
2. Add the controller object to the Management Map
(The figure below is an example of the *Compack* controller object added to the Management Map.)
3. “Ping” the controller to ensure connectivity
4. Define and configure the TRAP event handling, as required

Eltek's unique Enterprise ID is <12148>



(Example of NMS MIB tree, shown in a MIB browser)

DC Plant Information

The DC Plant configuration pages of *WebPower* and *PowerSuite* enables you to enter information that describe the power system, the site's name, serial number, installation and service dates, software name, etc.

Read also the "General tab" topic [Power System dialog box](#) (page 64) in the *PowerSuite* Help section.

Location – Map Coordinates

The **Map Coordinates** feature enables you to register the **exact global position** or location where the **DC power system** is installed. The global position is specified using a geographic coordinate system with 3 coordinates: **latitude**, **longitude** and **elevation**.

The global position data is stored in the controller, and used by the *MultiSite Monitoring PC Application* software to dynamically display the position of power system installations in maps.

Data Format

Usually, the data format for entering the 3 coordinates: latitude, longitude and elevation is

Sexagesimal Notation: DD° MM' SS.ss'' N or S

Degrees (°), minutes (') and seconds ('').

For greater precision, use the decimal fraction of seconds: SS.ss.

North (N) or South (S) of the equator.

E.g.: 66° 33' 38.95'' N

Latitude

Latitude is the angular distance, measured north or south from the equator, of a place on the Earth's surface, usually expressed in degrees. Parallels are imaginary lines along all the places on the Earth with the same latitude.

Latitude: (<DD>°<MM>' <SS.ss>' N/S)

Latitude ranges from 0° at the equator to 90°N (or +90°) at the North Pole; and to 90°S (or -90°) at the South Pole.

Longitude

Longitude is used to denote the location of a place on the Earth's surface east or west of the prime meridian.

A meridian is an imaginary line from the North Pole to the South Pole that connects all locations with the same longitude. The position of a point on the meridian is given by the latitude.

The Prime Meridian is, by international convention, one passing through the Royal Observatory, Greenwich, in east London, United Kingdom, known as the International Meridian or Greenwich Meridian.

Longitude: (<DD>°<MM>' <SS.ss>' E/W)

Longitude is given as an angular measurement ranging from 0° at the Prime Meridian to +180° eastward (or 180°E) and -180° westward (or 180°W).

Elevation

Elevation, or altitude, is used to indicate how high a place on the Earth's surface is from sea level (above mean sea level, AMSL).

The power system's elevation is entered **in meters above sea level** (AMSL).

Read also the "Location tab" topic [Power System dialog box](#) (page 64) in the *PowerSuite* Help section.

System Configuration ~ General

The generic power system configuration let you change all the relevant system parameters, values and characteristics, such as temperature scales, system polarity, language, system voltages, rectifiers and battery related values, and many similar parameters.

For an overview of options and commands, read the topic “[About Power System Configuration](#)” on page 181.

System Voltages Levels

You can display the power system voltages.

In *Compact*-based systems, via:

- The *WebPower* configuration web pages
- The *PowerSuite* application

In *Smartpack*- and *Smartpack2*-based systems, via:

- The *WebPower* configuration web pages
- The *PowerSuite* application
- The controller’s front keys

From the Smartpack2 Master Controller’s Front

You can display important system voltages by selecting, via the *Smartpack2 Master* controller’s front keys:

System Configuration > Power System > **System Voltages Levels**

#	Description	Value	Unit/Label	Note
	Reference Voltage	54,50	Vold DC	
	Boost Voltage	56,50	Vold DC	
	Battery Test End Voltage	45,60	Vold DC	
	Rectifier Standby Voltage	44,40	Vold DC	
	Battery Disconnect Voltage	43,00	Vold DC	
	Battery Reconnect Voltage	48,00	Vold DC	
	Rectifier OVS Limit	59,00	Vold DC	
	Rectifier Emergency Voltage	53,52	Vold DC	

From the Smartpack Controller’s Front

You can display important system voltages by selecting “**UserOption > VoltageInfo**”, via the *Smartpack* controller’s front keys.

Following voltages may be displayed selecting the *VoltageInfo* sub options (level 3):

<i>Option</i>	<i>Description</i>
<i>NomVolt</i>	Nominal output voltage
<i>BoostVolt</i>	Battery boost-charging voltage
<i>LowBatt1</i>	Voltage limit for Low Battery Alarm 1

<i>LowBatt2</i>	Voltage limit for Low Battery Alarm 2
<i>HighBatt1</i>	Voltage limit for High Battery Alarm 1
<i>HighBatt2</i>	Voltage limit for High Battery Alarm 2
<i>LVD 1</i>	Voltage limit for Low Voltage Disconnect unit 1

From PowerSuite

By clicking on the “**System Voltage Levels**” button, on the *PowerSuite* toolbar, you can also display and change important system voltages, such as:

- Nominal or Reference voltage (float)
- Boost voltage
- Battery Test End Voltage
- Rectifier standby voltage
- Battery disconnect voltage
- Battery reconnect voltage
- Rectifier OVS trip voltage

Refer also to *PowerSuite*’s System Voltage Levels dialog box topic.

From Configuration Web Pages

By clicking on the “**System Voltage Levels**” button, on the *home page* toolbar, you can also display and change important system voltages, such as:

- Nominal or Reference voltage (float)
- Boost voltage
- Battery Test End Voltage
- Rectifier standby voltage
- Rectifier OVS trip voltage
- Battery disconnect voltage
- Battery reconnect voltage

For more information, refer to *WebPower Online Help*.

System Commands

This logical subgroup lets you issue or activate **specific commands related to the whole system**. For example, following commands might be available in *Smartpack2 Master Controller*’s submenu:

Commands > **System Commands**

#	Description	Action	Unit/Label	Note
	Reset Manual Alarms	☐	No	Read about “ Alarm Reset ” on page 242
	Reset Number of Modules	☐	No	Read about “ Resetting the Number of Rectifiers ” on page 278
	Delete Event Log	☐	No	Read about “ Types of System Logs ” on page 230
	Set Default Configuration	☐	No	

Issuing **commands is allowed** using a Pin-Code.

NOTICE:

The default Service Access Level password or Pin-Code is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

System Calibration

The *Eltek's* DC power systems are factory calibrated.

Normally, **the power system will NOT require additional calibration**, except when the system's controller or control units are re-installed in other power systems.

Definition

The power system calibration is the process of establishing the **relationship between a measuring device** (system inputs) and the **units of measure** (displayed measurements).

The accuracy of the displayed measurements depends on how good calibration data is entered in the control units (calibration quality).

What to Calibrate

Following types of inputs and measuring functions can be calibrated in *Eltek's* DC power systems:

- **Current Sense Inputs**
 - Load Current calibration
 - Battery Current calibration
- **Voltage Monitoring Inputs**
 - Battery Voltage calibration
 - Symmetry Voltage calibration
- **Temperature Sense Inputs**
 - Battery Temperature calibration
- **Earth Fault Detection Function**
 - Calibration of Earth Fault Detection

Read following topics for information about available inputs and outputs and related functions:

- [“The Smartpack2 Basic Controller - Overview”](#) on page 353
- [“The Smartpack Controller - Overview”](#) on page 355
- [“The Compack Controller - Overview”](#) on page 358
- [“The Smartnode Control Unit - Overview”](#) on page 360
- [“The Battery Monitor Control Unit - Overview”](#) on page 360
- [“The Load Monitor Control Unit - Overview”](#) on page 361
- [“The I/O Monitor Control Unit \(T1\) - Overview”](#) on page 361

- [“The I/O Monitor2 Control Unit \(T2\) - Overview”](#) on page 363
- [“The I/O Monitor3 Control Unit \(T3\) - Overview”](#) on page 364
- [“The Mains Monitor Control Unit - Overview”](#) on page 364
- [“Earth Fault Detection”](#) on page 244

<<< [Back to dialog box “System Calibration”](#) on page 218

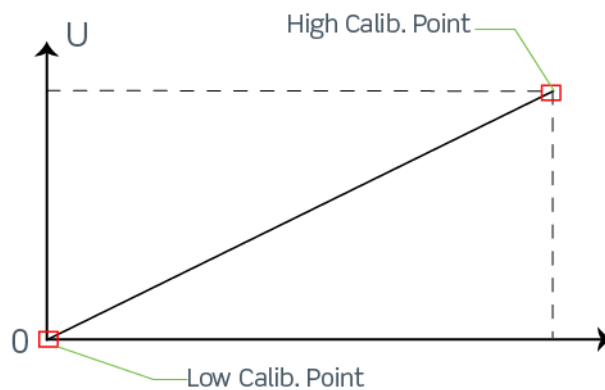
How to Calibrate

The *Eltek's* DC power systems are factory calibrated at 2 calibration points: at a **Low Calibration Point** and at a **High Calibration Point**.

The two calibration points' units of measurement can be Ampere, Volt, degree Celsius, Ohms, etc.

Power System's Calibration

Units, U=A, V, °C, Ω, etc.



Temperature calibration is performed under normal temperature conditions, e.g. 20°C to 30°C.

In short, the calibration process consists of setting the power system in the suitable calibration stage, measuring the actual parameter and entering the parameter in *PowerSuite*.

Which is the power system's most **suitable calibration stage depends on the type a calibration** to perform. For example, a suitable calibration stage could be to load the system with 50-60% of the system's maximum output power, or turning off the rectifiers, or load the battery bank so that the battery current is at least 30% of the current shunt rating, etc.

The calibration process consists of carrying out following steps:

High Calibration Point

4. Setting the power system at the **High Calibration Point stage**
5. **Measuring** the actual current, voltage, temperature, etc. with an accurate and reliable ammeter, voltmeter or thermometer

6. **Entering the measured value** in the system's control units (e.g. via the *PowerSuite* application)

Low Calibration Point

Only to be performed if calibration of the Low Calibration Point is necessary.

4. Setting the power system at the **Low Calibration Point stage**
5. **Measuring** the actual current, voltage or temperature with an accurate and reliable ammeter, voltmeter or thermometer
6. **Entering the measured value** in the system's control units (e.g. via the *PowerSuite* application)

NOTICE: When calibrating current shunts, you must also enter the current shunt rating, in addition to the low and high calibration measurements.
Refer to the topic [Alarm Monitor Scale tab \(current shunt\)](#) (page 171) in *PowerSuite Help*.

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Calibration - Battery Current

If you need to calibrate the power system's Battery Current, follow this procedure, while **the power system is operating normally**.

Low Calibration Point

Performed when the battery is disconnected -- e.g. via the LVBD contactor.

Carry out the following:

1. Disconnect the batteries from the load, using the LVBD contactor
2. Measure with a clip-on ammeter and confirm that the discharge current is 0A
3. Enter the value, 0A, as a "**Low Calibration Point**" in *PowerSuite*, in the "BatteryCurrentX" dialog box, under the Calibration tab, and -- **Click on the Apply button**, in the dialog box

High Calibration Point

Performed during battery discharging -- while the rectifiers are turned off, or have reduced output voltage -- and the battery current is at least 30% of the current shunt rating.

During battery charging, the battery current is defined as positive (+); during discharge, it is defined as negative (-).

Carry out the following:

1. Turn the rectifiers OFF, and ensure that the batteries are delivering an stable current to the load
2. Measure the discharge current with a clip-on ammeter
3. Enter the measured current, as a value (e.g. "-95") in the "**High Calibration Point**" in *PowerSuite*, in the "BatteryCurrentX" dialog

box, under the Calibration tab, and
-- **Click on the Apply button**, in the dialog box

NOTICE: When calibrating current shunts, you must also enter the current shunt rating, in addition to the low and high calibration measurements.

Refer to the topic [Alarm Monitor Scale tab \(current shunt\)](#) (page 171) in *PowerSuite Help*.

<<< [Back to dialog box “System Calibration” on page 218](#)

Calibration - Battery Voltage

If you need to calibrate the power system’s Battery Voltage, follow this procedure, while **the power system is operating normally**.

NOTICE: You do not need to calibrate the Battery Voltage’s “Low Calibration Point”.

High Calibration Point

Performed during battery discharging -- while the rectifiers are turned off, or have reduced output voltage -- and the battery current is at least 30% of the current shunt rating.

Carry out the following:

1. Turn the rectifiers OFF, and ensure that the batteries are delivering an stable current to the load
2. Measure the battery output voltage at the load terminals with a voltmeter
3. Enter the **measured voltage**, as a value in the “**High Calibration Point**” in *PowerSuite*, in the “BatteryVoltage” dialog box, under the Calibration tab, and
-- **Click on the Apply button**, in the dialog box

<<< [Back to dialog box “System Calibration” on page 218](#)

Calibration - Battery Symmetry Voltage

If you need to calibrate the power system’s Battery Symmetry Voltage, follow this procedure, while **the power system is operating normally**.

For information about **how to connect** the battery symmetry cables using the *Smartpack* controller’s inputs (internal) or the Battery Monitor module’s inputs (external) in –48V and +24V systems, refer to topic “[Battery Symmetry Measurements](#)” on page 296.

Read also “[Battery Banks, Strings and Blocks](#)” on page 294

NOTICE: You do not need to calibrate the Battery Symmetry Voltage’s “Low Calibration Point”.

High Calibration Point

Carry out the following for each battery symmetry input:

1. Ensure that the battery fuses are ON, and that the power system is operating normally
2. Measure with a voltmeter, the battery symmetry voltage.

NOTICE:

For information about **how to measure**, read the section for the actual system voltage and symmetry method, in the topic below “[How to Measure Symmetry Calibration Voltages](#)” on page 223

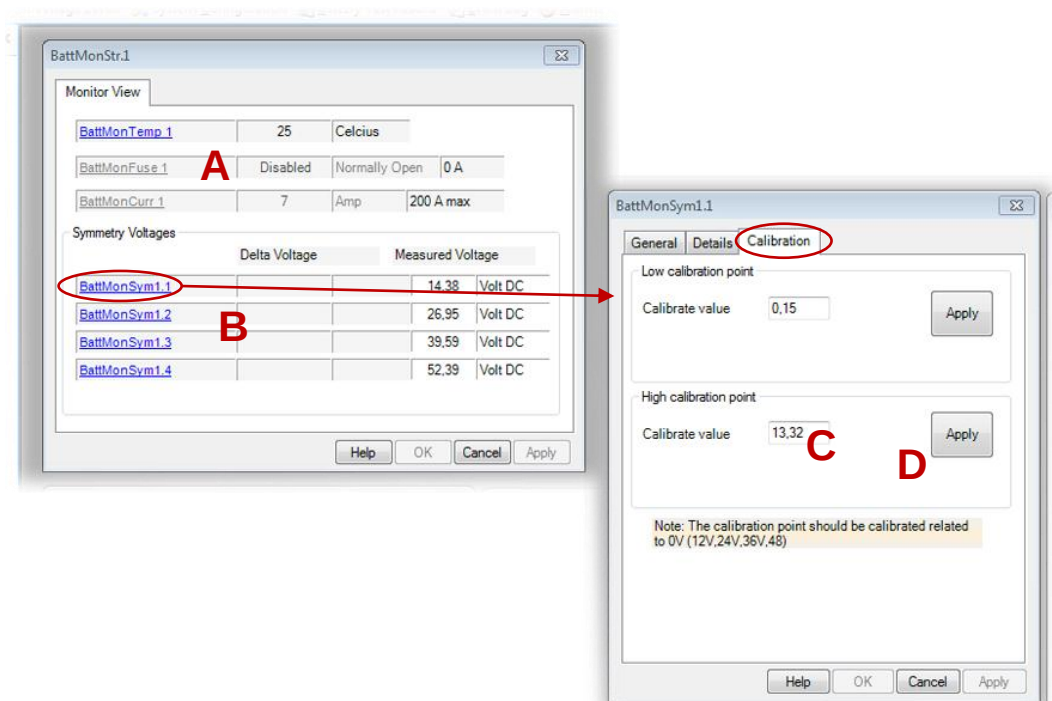
3. Enter the **measured voltage**, as a value in the “**High Calibration Point**” in *PowerSuite*, under the Calibration tab of:
— the “SymmDeltaX” dialog box (*Smartpack* inputs),
OR
— the “BattMonStr X” dialog box (*Battery Monitor* inputs), ((C) in the dialog box in the example below)

AND

-- Click on the **Apply** button, (D) in the dialog box

Calibration dialog box — Example

In the example below, you can see the *PowerSuite* dialog boxes to enter the symmetry calibration values for the Battery Monitor’s Battery Symmetry input 1.



WARNING:

Disregard the Note in the dialog box, and refer to the section below “How to Measure the Symmetry Calibration Values”.

<<< Back to dialog box “[System Calibration](#)” on page 218

How to Measure Symmetry Calibration Voltages

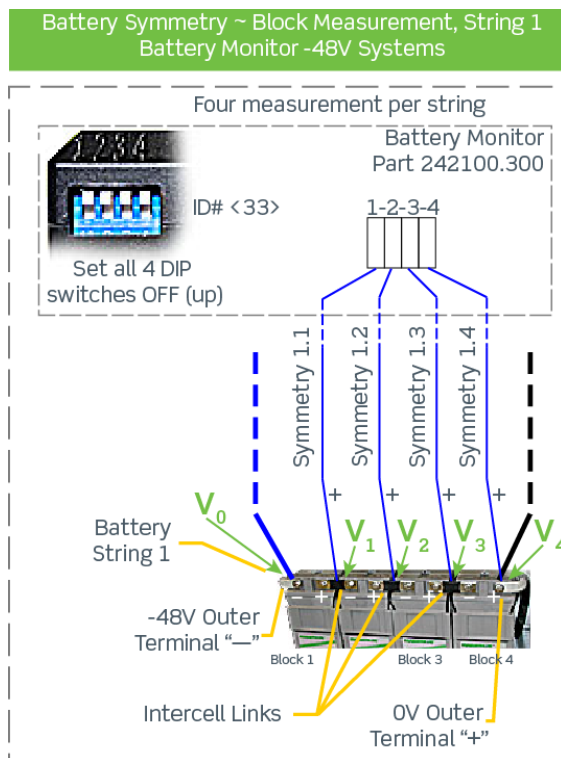
How and at which points to measure the symmetry calibration voltages, depends on the power system’s output voltage, on which symmetry inputs are used and on the symmetry method implemented.

For information about how to measure symmetry calibration voltages, read the topic below that applies to the power system’s output voltage and symmetry method.

–48V Systems ~ Battery Monitor’s Symmetry Inputs

To measure the *Battery Monitor’s* (external) symmetry voltages — e.g. for calibration purposes — in **–48V power systems**, use a voltmeter between following points:

Block Measurements



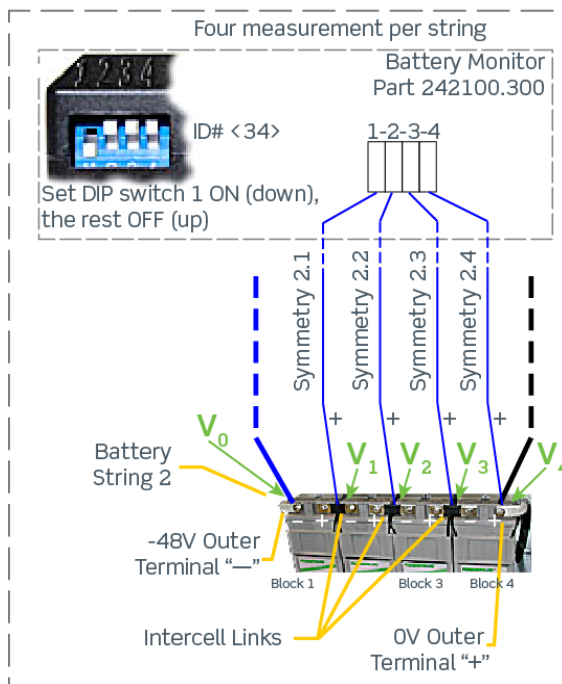
Example of measurement points for symmetry voltages, for the Battery Monitor’s **Block Measurement Method** in 48V DC power systems. String 1

Block Measurements

Battery Monitor ID#33 for battery string 1 (lowest)

- Symmetry 1.1:
measure between point **V₀** and **V₁** (~12V)
- Symmetry 1.2:
measure between point **V₀** and **V₂** (~24V)
- Symmetry 1.3:
measure between point **V₀** and **V₃** (~36V)
- Symmetry 1.4:
measure between point **V₀** and **V₄** (~48V)

Battery Symmetry ~ Block Measurement, String 2 Battery Monitor -48V Systems



Example of measurement points for symmetry voltages, for the Battery Monitor's **Block Measurement Method** in 48V DC power systems. String 2

Block Measurements

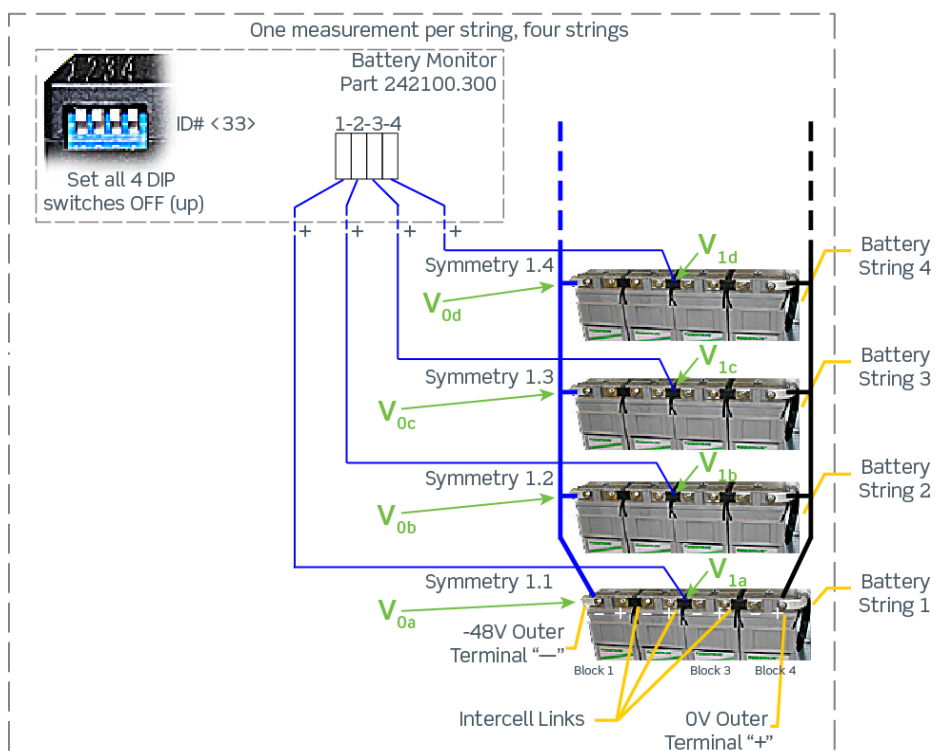
Battery Monitor ID#34 for battery string 2

- Symmetry 2.1: measure between point V_0 and V_1 (~12V)
- Symmetry 2.2: measure between point V_0 and V_2 (~24V)
- Symmetry 2.3: measure between point V_0 and V_3 (~36V)
- Symmetry 2.4: measure between point V_0 and V_4 (~48V)

Battery Monitor ID#35 for battery string 3
Battery Monitor ID#36 for battery string 4
Etc.

Mid-point Measurements

Battery Symmetry ~ Mid-point Measurement, String 1 to 4 Battery Monitor -48V Systems



Example of measurement points for symmetry voltages, for the Battery Monitor's **Mid-point Measurement Method** in 48V DC power systems. String 1, 2, 3 and 4

NOTICE:

Always connect Battery Monitor with ID#<33> to battery strings 1 (lowest), 2, 3 and 4. Then Battery Monitor with ID#<34> to string 5, 6, 7 and 8. And so on. PowerSuite will then refer to the correct battery string.

Mid-point Measurements

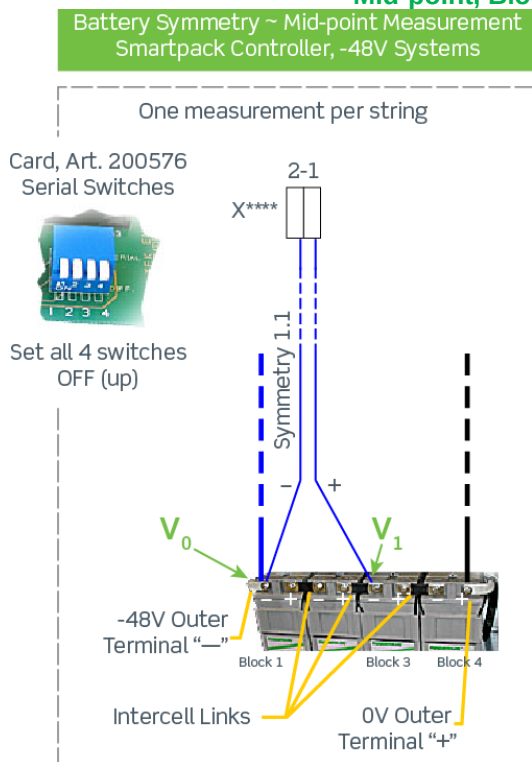
Battery Monitor ID#33 for battery string 1 (lowest), 2, 3 and 4

- Symmetry 1.1:
measure between point V_{0a} and V_{1a} (~24V)
- Symmetry 1.2:
measure between point V_{0b} and V_{1b} (~24V)
- Symmetry 1.3:
measure between point V_{0c} and V_{1c} (~24V)
- Symmetry 1.4:
measure between point V_{0d} and V_{1d} (~24V)

-48V Systems ~ Smartpack's Symmetry Inputs

To measure the *Smartpack's* (internal) symmetry voltages — e.g. for calibration purposes — in **-48V power systems**, use a voltmeter between following points:

Mid-point, Block and Double-point Measurements

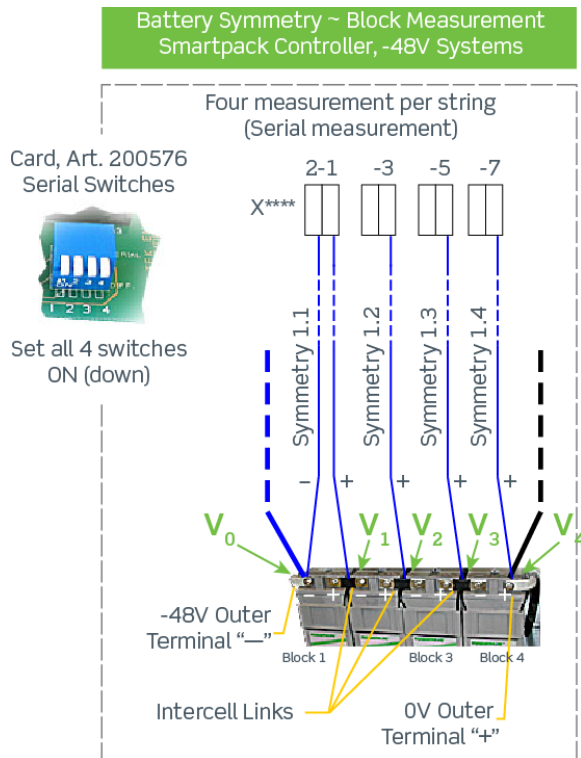


Example of measurement points for symmetry voltages,

Mid-point Measurements

- Symmetry 1.1:
measure between point V_0 and V_1 (~24V)

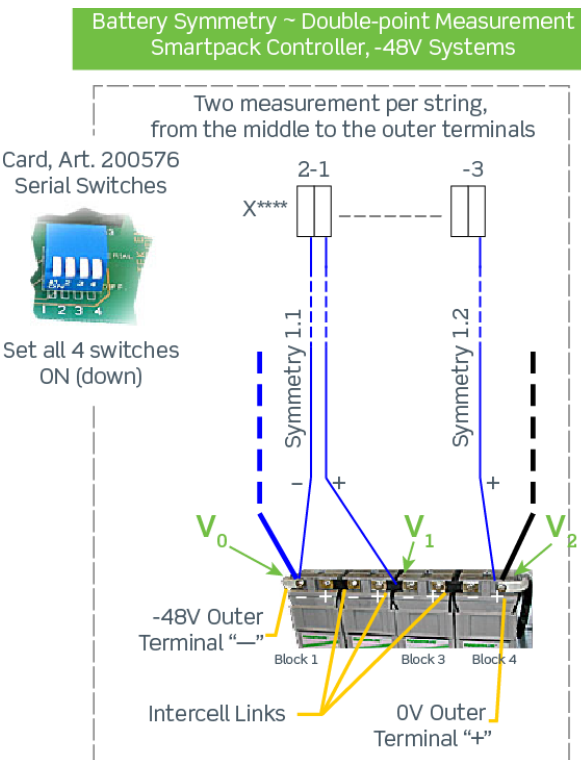
for the Smartpack controller's **Mid-point Measurement Method** in 48V DC power systems



Example of measurement points for symmetry voltages,
for the Smartpack controller's **Block Measurement Method** in 48V DC power systems

Block Measurements

- Symmetry 1.1:
measure between point **V₀** and **V₁** (~12V)
- Symmetry 1.2:
measure between point **V₁** and **V₂** (~12V)
- Symmetry 1.3:
measure between point **V₂** and **V₃** (~12V)
- Symmetry 1.4:
measure between point **V₃** and **V₄** (~12V)



Example of measurement points for symmetry voltages,
for the Smartpack controller's **Double-point Measurement Method** in 48V DC power systems

Double-point Measurements

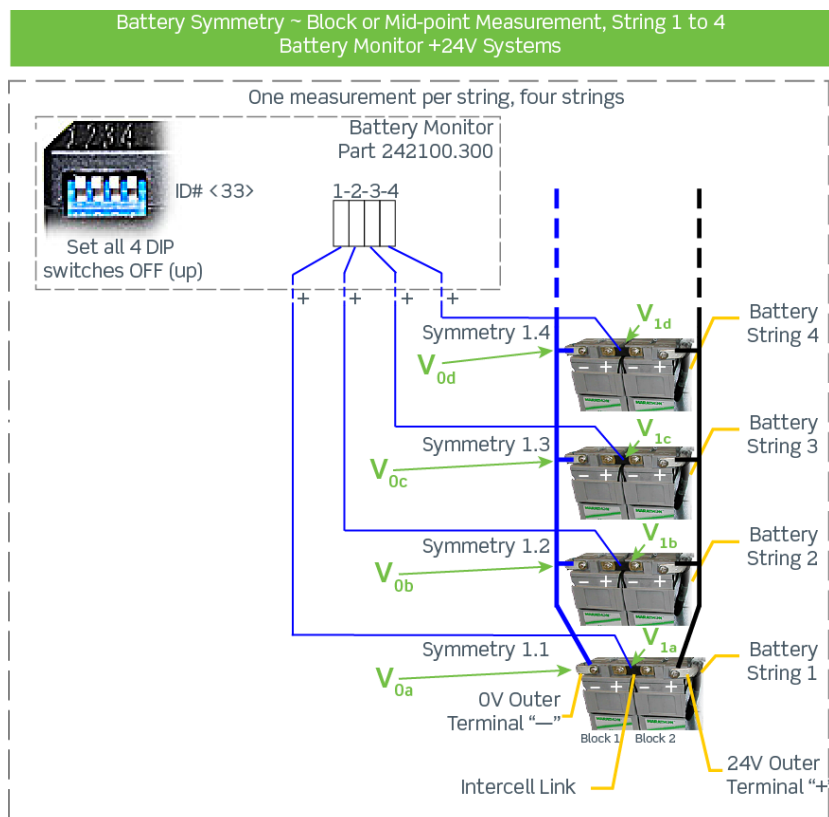
- Symmetry 1.1:
measure between point **V₀** and **V₁** (~24V)
- Symmetry 1.2:
measure between point **V₁** and **V₂** (~24V)

+24V Systems ~ Battery Monitor's Symmetry Inputs

To measure the *Battery Monitor's* (external) symmetry voltages — e.g. for calibration purposes — in **+24V power systems**, use a voltmeter between following points:

Notice that in +24V power systems using 12V battery blocks, the **Mid-Point Measurement Method** and the **Block Measurement Method** are equal, as the strings consist of only two battery blocks.

Block or Mid-point Measurements



Example of measurement points for symmetry voltages, for the Battery Monitor's **Block or Mid-point Measurement Method** in 24V DC power systems. String 1, 2, 3 and 4

NOTICE:

Always connect Battery Monitor with ID#<33> to battery strings 1 (lowest), 2, 3 and 4. Then Battery Monitor with ID#<34> to string 5, 6, 7 and 8. And so on. PowerSuite will then refer to the correct battery string.

Block or Mid-point Measurements

Battery Monitor ID#33 for battery string 1 (lowest), 2, 3 and 4

- Symmetry 1.1:
measure between point V_{0a} and V_{1a} (~12V)
- Symmetry 1.2:
measure between point V_{0b} and V_{1b} (~12V)

- Symmetry 1.3:
measure between point V_{0c} and V_{1c} (~12V)
- Symmetry 1.4:
measure between point V_{0d} and V_{1d} (~12V)

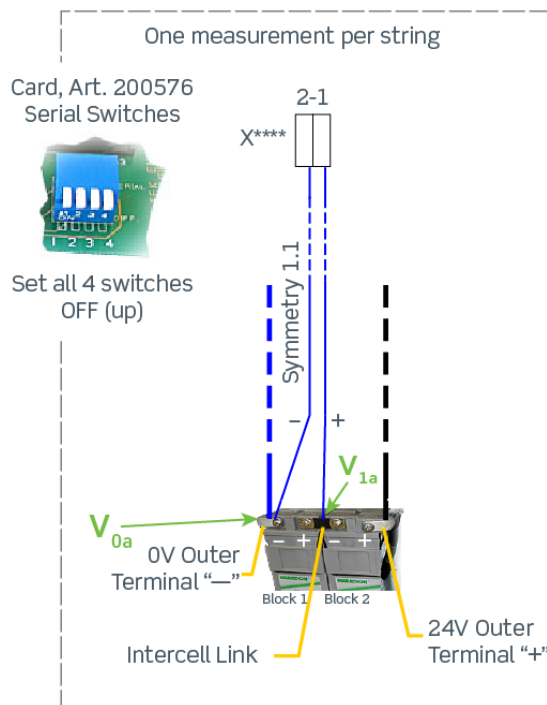
+24V Systems ~ Smartpack's Symmetry Inputs

To measure the *Smartpack's* (internal) symmetry voltages — e.g. for calibration purposes — in +24V power systems, use a voltmeter between following points:

Notice that in +24V power systems using 12V battery blocks, the **Mid-Point Measurement Method** and the **Block Measurement Method** are equal, as the strings consist of only two battery blocks.

Block or Mid-point Measurements

Battery Symmetry ~ Block or Mid-point Measurement
Smartpack Controller, +24V Systems



Example of measurement points for symmetry voltages,
for the *Smartpack* controller's **Block or Mid-point
Measurement Method** in 24V DC power systems

Block or Mid-point Measurements

- Symmetry 1.1:
measure between point V_{0a} and V_{1a} (~12V)

Calibration - Battery Temperature

If you need to calibrate the power system's Battery Temperature, follow this procedure, while **the power system is operating normally**.

NOTICE: You do not need to calibrate the Battery Temperature's "Low Calibration Point".

High Calibration Point

The calibration must be performed with an installed battery temperature sensor, and under normal temperature conditions, e.g. 20°C to 30°C.

Carry out the following:

1. Measure the temperature -- as close to the temperature sensor as possible -- with a thermometer, while the batteries are under normal temperature conditions
2. Enter the **measured temperature**, as a value in the "**High Calibration Point**" in *PowerSuite*, in the "BatteryTempX" dialog box, under the Calibration tab, and
-- **Click on the Apply button**, in the dialog box

<<< [Back to dialog box "System Calibration" on page 218](#)

Calibration - Earth Fault Detection

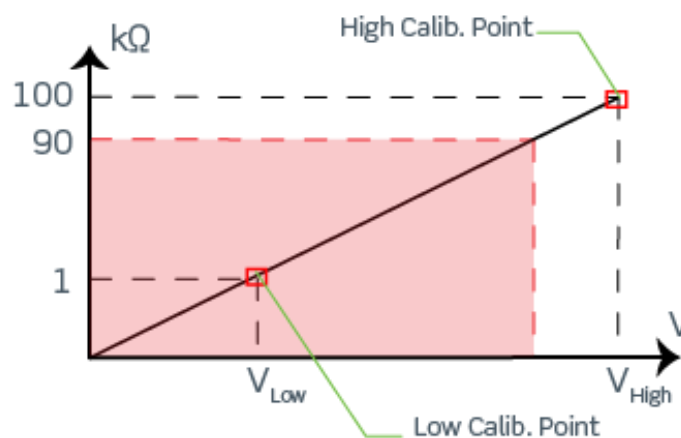
If you need to calibrate the power system's Earth Fault Detection function, follow this procedure, while **the power system is operating normally**.

WARNING:

To be able to use the Earth Fault Detection functionality, the power system must be implemented with "floating earth", which means that "Telecom Earth" (TE) or DC Earth must NOT be connected to the power system's DC output rail (+ or -).

Read more in topic "[About AC, DC Earthing Systems](#)" on page 243

Earth Fault Calibration



WARNING:

The low and the high calibration points must always be calibrated

connecting resistors between system's chassis and **the same reference point**, the + or the – supply conductors.
E.g. both points between chassis and the Common DC Output Rail

Low Calibration Point

Carry out the following:

1. Connect a 1 k Ω resistor between system's chassis and system's Common DC Output Rail (regardless it is the + or – supply conductor). A short-circuit (0 k Ω resistor) can also be used.
2. Enter the value, 1 k Ω , as a “**Low Calibration Point**” in *PowerSuite*, in the “Earth Faulty X” dialog box, under the Calibration tab, and -- **Click on the Apply button**, in the dialog box.
Read more in topic [Control Unit Earth Fault tab](#) (page 158), in *PowerSuite Online Help*.
3. Remove the 1 k Ω resistor

High Calibration Point

To obtain a better calibration, select a value for the *high calibration point* that is close to the desired earth fault trigger value (R_{Limit}).

For example, if you want that to trigger an alarm when the *ground-to-supply conductor* impedance is less than $R_{Limit}=90$ k Ω (red area in the diagram above), then you could choose to calibrate the *high calibration point* with e.g. a 100 k Ω resistor.

Carry out the following:

1. Connect a 100 k Ω resistor between system's chassis and system's Common DC Output Rail (regardless it is the + or – supply conductor). The same reference as used for calibrating the low calibration point.
2. Enter the value, 100 k Ω , as a “**High Calibration Point**” in *PowerSuite*, in the “Earth Faulty X” dialog box, under the Calibration tab, and -- **Click on the Apply button**, in the dialog box.
Read more in topic [Control Unit Earth Fault tab](#) (page 158), in *PowerSuite Online Help*.
3. Remove the 100 k Ω resistor

<<< [Back to dialog box “System Calibration” on page 218](#)

Types of System Logs

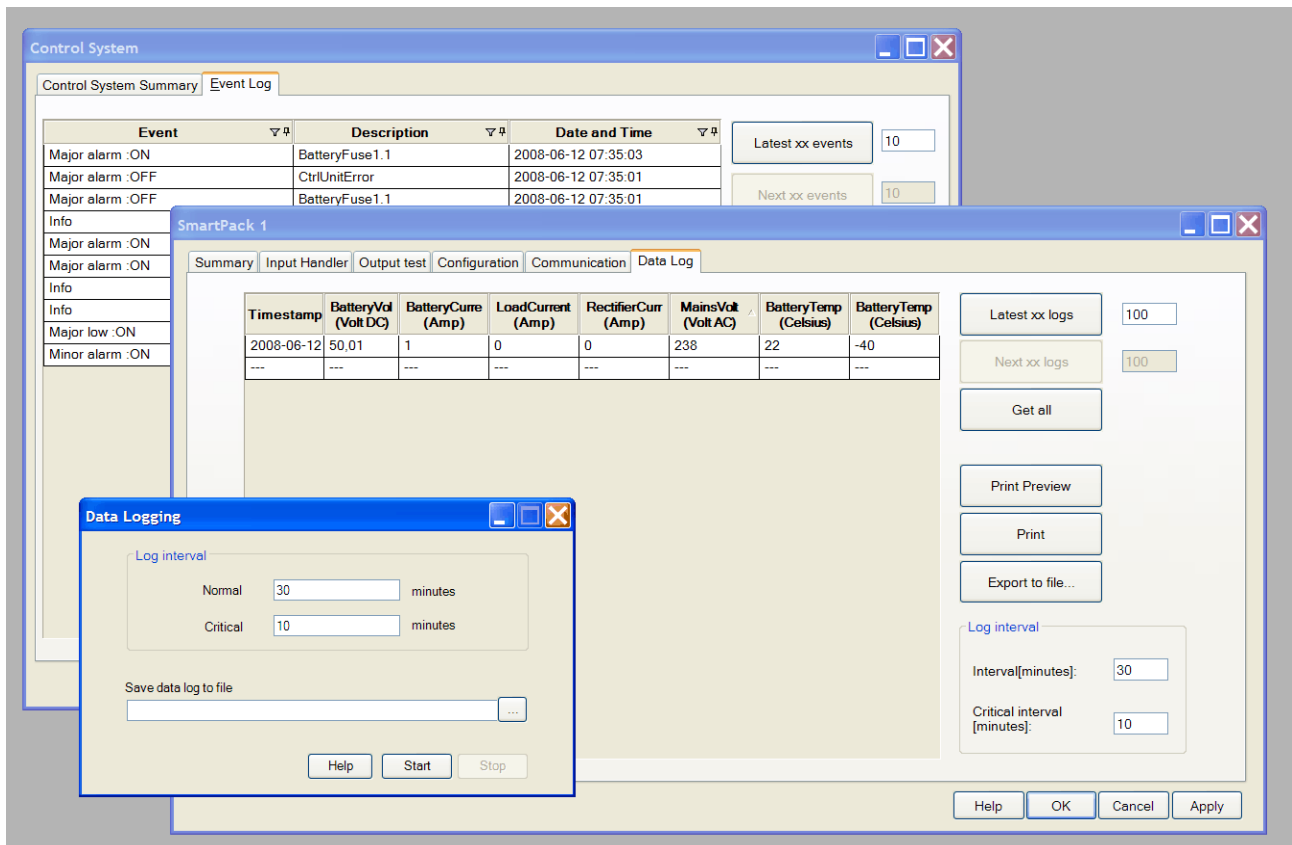
The control system in *Eltek*'s power systems keeps several types of useful logs or event, data records that you can present in the controller's display or using other GUI.

Also, you can export the logs and data records to a storage media, or print them out on paper.

The control system implements following types of logs:

- **Event Log** (system events)
- **Data Log** (key system data)

- **Data Logging** (key system data)
- **Measurement Logs**
 - Energy Log
 - Load Monitor Energy Log
 - Mains Outage Log
 - Generator Run Hours Log
 - Generator Fuel Consumption Log
 - Battery Discharge Cycles Log



This figure shows examples of *PowerSuite* dialog boxes for Event Log, Data Log and Data Logging.

Event Log

The Event Log is a system related log of **power system events** automatically registered by the system controller.

You can access the log either using the controller's front keypad or other GUI. E.g., available options in *Smartpack2 Master Controller's* submenu:

Logs/Report > **Event Log**

#	Date and Time	Description	Event	Note
	yyyy.mm.dd hh:mm:ss	RectifierError	MinorAl:On	
	yyyy.mm.dd hh:mm:ss	SymmVolt 1.4	MajorAl:On	
	yyyy.mm.dd hh:mm:ss	LVD close	Info:On	
	yyyy.mm.dd hh:mm:ss	Door alarm	MajorAl:Off	
	yyyy.mm.dd hh:mm:ss	OutdoorTemp 81.1	Info:Off	

Read more in topic [Control System Event Log tab](#) (page 142) in the *PowerSuite* Help section

Data Log

A log of **key system data** (voltages, current and temperature values) **registered by the system controllers, or by other connected control units** (e.g. I/O Monitor, Mains Monitor) at the intervals specified by e.g. in *PowerSuite*.

You can access the log either using the controller's front keypad or other GUI.

Read more in topic [Control Unit Data Log tab](#) (page 152) in the *PowerSuite* Help section

Data Logging

Data Logging is a log of **key system data** (voltages, current and temperature values) that **PowerSuite registers** or saves in a file in your computer, not in the controller.

PowerSuite acquires the key system data by interrogating the system controller at the specified intervals.

You can access the log via the *PowerSuite* application.

Read more in topic [Data Logging dialog box](#) (page 43) in the *PowerSuite* Help section

Measurement Logs

Logs of specific measurements or calculations (consumed energy, time duration, volume, counter) registered by the system controller.

Read more in topic "[Measurement Logs](#)" on page 232.

Measurement Logs

Measurement Logs are **records of specific measurements** or calculations (consumed energy, time duration, volume, counter) **registered by the system controller**.

The control system implements following types of measurement logs:

- **Energy Logs** (Wh)
(for Mains, Battery, Load, Rectifiers, Generator, Solar Chargers)
- **Load Monitor Energy Logs** (Wh)
- **Mains Outage Log** (time duration)
- **Generator Run Hours Log** (time duration)
- **Generator Fuel Consumption Log** (volume)
- **Battery Discharge Cycles Log** (counter)

Read more in topic "[Generic about Measurement Logs](#)", page 232.

Generic about Measurement Logs

All Measurement Logs (energy, mains outage, run hours, fuel consumption, discharge cycles) are based on the same logic, and represent **records of specific**

measurements or calculations (consumed energy, time duration, volume, counter) **registered by the system controller.**

Battery

Status Configuration Test Boost Temperature monitor Symmetry configuration **Energy** Discharge cycles

Energy			
Energy Last	Hour [wh]	Day [kwh]	Week [kwh]
1	-4748	17	30
2	-4748	16	59
3	-4748	17	0
4	-4748	17	58
5	-4750	2	0
6	-4755	58	0
7	-4755	59	0
8	-4755	48	0
9	-4753	12	0
10	-4754	63	0
11	-4749	0	0
Energy Last	Hour [wh]	Day [kwh]	Week [kwh]
45	-4755	0	0
46	-4755	0	0
47	-4755	0	0
48	-4755	0	0
49	-4755	0	0
50	-4755	0	0
51	-4755	0	0
52	-4755	0	0
MinEnergy	-4748	0	0
MaxEnergy	11220		

Energy [wh] -829853

Export to file...

Help OK Cancel Apply

This figure shows an example of *PowerSuite* dialog box with the battery banks' Energy Log.

The following information is **common to all measurement logs**:

- Log length: 52 rows max (A)**
 The system controller stores and displays the **latest 52 sets of measurements** or calculations.
 By dragging the split box (I) down to the middle (H), you can browse the log in two different panes.
- Row 1, at the top (B), always displays the set of measurements or calculations for the last hour (C), last day (D), last week (E) and last month**
 The entries are logged at the beginning of every hour, at hh:00; every day at 24:00; every Sunday at 24:00 and the last day of every month, at 24:00
- The value on the lower left corner (F) is a **counter that displays a total amount** -- e.g. the total energy supplied or total time elapsed or total used volume or total number of occurrences – calculated **since the power system's first start-up** or commissioning date.
 This total amount counter **cannot be reset**, as you cannot reset your car's mileage recorder or your home's electricity meter or kWh meter.
- In Energy Logs, two additional **"Min. Energy" and "Max. Energy" rows (G)** at the bottom display the maximum and minimum energy

supplied or used **since the first system start-up** or commissioning date.

NOTICE:

The Energy Log for the battery bank may display positive and negative values. Positive values represent energy provided by the battery to the load, while negative values represent energy used by the battery via recharging.

The table below shows an example of the calculations performed by the controller for a Measurement Log. The log entries could be displayed on October 31st.

The last entry (row 1) shows that e.g. the monitored device has been running:

- 360 minutes the last day (Oct. 31st)
- 48 hours the last week (J) (from Oct. 25th to 31st)
- 189 hours the last month (October)

Measurement Log

Last	Day (min)	Week (hours)	Month (hours)		
1	360	18	189	31.10.2010	Sunday
2	480	0	0	30.10.2010	Saturday
3	0	0	0	29.10.2010	Friday
4	0	0	0	28.10.2010	Thursday
5	1200	0	0	27.10.2010	Wednesday
6	600	0	0	26.10.2010	Tuesday
7	240	0	0	25.10.2010	Monday
8	480	26	0	24.10.2010	Sunday
9	240	0	0	23.10.2010	Saturday
10	0	0	0	22.10.2010	Friday
11	0	0	0	21.10.2010	Thursday
12	0	0	0	20.10.2010	Wednesday
13	120	0	0	19.10.2010	Tuesday
14	720	0	0	18.10.2010	Monday
15	120	28	0	17.10.2010	Sunday
16	480	0	0	16.10.2010	Saturday
17	360	0	0	15.10.2010	Friday
18	540	0	0	14.10.2010	Thursday
19	0	0	0	13.10.2010	Wednesday
20	120	0	0	12.10.2010	Tuesday
21	60	0	0	11.10.2010	Monday
22	600	28	0	10.10.2010	Sunday
23	600	0	0	09.10.2010	Saturday
24	720	0	0	08.10.2010	Friday
25	720	0	0	07.10.2010	Thursday
26	720	0	0	06.10.2010	Wednesday
27	480	0	0	05.10.2010	Tuesday
28	240	0	0	04.10.2010	Monday
29	360	29	0	03.10.2010	Sunday
30	300	0	0	02.10.2010	Saturday
31	480	0	0	01.10.2010	Friday
32	480	0	0	24.09.2010	Thursday
33	0	0	0	23.09.2010	Wednesday
34	0	0	0	22.09.2010	Tuesday
35	0	0	0	21.09.2010	Monday
36	0	0	0	20.09.2010	Sunday
37	300	36	0	19.09.2010	Saturday
38	240	0	0	18.09.2010	Friday
39	120	0	0	17.09.2010	Thursday
40	480	0	0	16.09.2010	Wednesday
41	300	0	0	15.09.2010	Tuesday
42	120	0	0	14.09.2010	Monday
43	600	0	0	13.09.2010	Sunday
44	900	30	0	12.09.2010	Saturday
45	600	0	0	11.09.2010	Friday
46	300	0	0	10.09.2010	Thursday
47	0	0	0	09.09.2010	Wednesday
48	0	0	0	08.09.2010	Tuesday
49	0	0	0	07.09.2010	Monday
50	0	0	0	06.09.2010	Sunday
51	0	0	0	05.09.2010	Saturday
52	0	0	0	04.09.2010	Friday

Total number of hours logged in October

On Oct 21st the power system is switched ON, but the monitored devices are not running

Power system is switched OFF from Sep 24th to Oct 1st

Entries logged before the power system was switched OFF

This table shows an example of Measurement Log entries displayed on October 31st.

- If the monitored devices (e.g. rectifiers, generator, etc.) are **not running** for longer periods of time, the log will **display "0"** for the last hour, last day, last week.
See the table in the example above.
- If the power system is **switched OFF** for a period of time, **no data is entered** for the down-time, and the previous log entries are kept.
See the table in the example above.

Energy Log

The Energy Log is a *measurement log*, and represents an efficient way of logging the **power system's energy usage**, (Wh).

The system controller measures almost continuously the energy delivered from the system **batteries**, through the system **load fuses** and from the **rectifiers**, and the energy supplied to the system from the **power grid** or a connected AC **generator** or a **solar charger**.

For example, following data may be presented in the controller's display selecting the Energy log sub options:

Option	Description				
	Battery	Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓	Batteries' energy per hour, day, week and total		
	Load	Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓	Load's energy per hour, etc (as above)		
Energy log→	Rectifier	Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓	Rectifiers' energy per hour, etc (as above)		
	Generator	Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓	AC Generator's energy per hour, etc (as above)		
	SolarCharger	Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓	Sola Chargers' energy per hour, etc (as above)		

For each of them, the controller logs the **energy** provided during the last hour, the **energy used** the last day and the last week and the **total energy** provided (used) since the first system start-up.

The system controller stores the **latest 52 sets of measurements** or calculations, which can be displayed by the Energy Log.

NOTICE:

To monitor the **energy provided to the system by the grid** (AC mains), a mains monitor must be connected to the system.

Read more in topic [Mains Monitor nn dialog box](#) (page 70) in the *PowerSuite* Help section.

NOTICE:

To monitor the **energy provided through a specific load fuse**, a load monitor must be connected to the system.

Read more in topic "[Load Monitor Energy Log](#)" on page 236, and in topic [Load Primary nn dialog box](#) (page 99) in the *PowerSuite* Help section.

Batteries Energy Log				
Comment	Calculation #	Hour Wh	Day kWh	Week kWh
Latest calculation	1	50	2	25
Last but one calculation	2	60	4	30
	3	40	1	10
	51	20	3	12
Oldest calculation	52	55	2	15
Used kWh (total) >>>				650

The table above shows an example of Energy Log for the system batteries. The same Energy Log can also be displayed in *PowerSuite* interface, see an example in topic "[Generic about Measurement Logs](#)", page 232.

While the total energy provided (used) since the first system start-up is continuously updated, the controller calculates the values for the energy delivered or supplied every hour, every day and every week.

For example, the "Day kWh" value for the latest calculation represents the energy consumption for the latest 24 hours (calculations).

Read more in topic "[Generic about Measurement Logs](#)", page 232.

Load Monitor Energy Log

The Load Monitor Info is a *measurement log*, and represents an efficient way of logging the **energy delivered** (Wh) **through each load fuse**, when monitored with a Load Monitor CAN Bus node (unit).

After selecting the node (unit) number and the input number used to monitor the output fuse (or MCB), the Load Monitor Info command displays the **latest**

output voltage, output current and power delivered through the fuse. It also displays the **total energy** (Wh) delivered through the fuse to the load since the first system start-up.

For example, following data may be presented in the controller's display selecting the Load Monitor Info sub options:

Option	Description
Unit 01.x ↑↓ Input 01.1 ↑↓	V – A – W – Total kWh Displays for each of the selected inputs:
Unit 02.x ↑↓ Input 02.1 ↑↓	V – A – W – Total kWh the latest output voltage, output current,
LoadMonitor Info→	output power and total energy
Unit nn.x ↑↓ Input nn.1 ↑↓	V – A – W – Total kWh delivered trough the load fuse

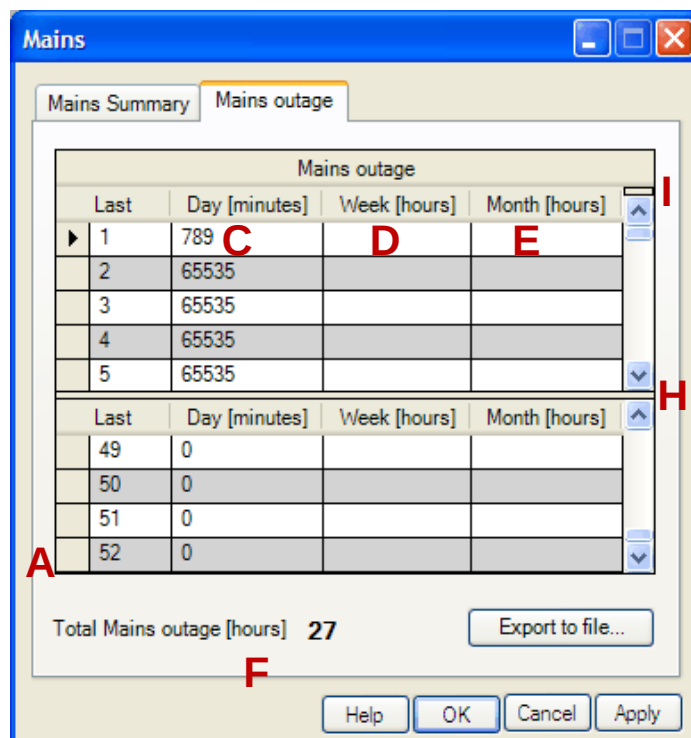
The system controller stores the **latest 52 sets of measurements** or calculations.

See also an example in topic Monitor View tab – Load Primary in the *PowerSuite* Help section.

Read more in topic “[Generic about Measurement Logs](#)”, page 232.

Mains Outage Log

The Mains Outage Log is a *measurement log*, and represents an efficient way of logging the **AC Mains outages** or **how long time** the power system's **AC Mains feed has been OFF**, (time period).



This figure shows an example of *PowerSuite* dialog box with the Mains Outage Log.

The Mains Outage Log displays **how long time** the power system's AC Mains feed has been OFF during **the last day**, in minutes (C); and during the **last week** (D) and the **last month** (E), in hours.

It also displays **how many hours** the AC Mains feed has been OFF since the first **system start-up** (F)

The system controller stores the **latest 52 sets of measurements** or calculations (A), which can be displayed by the Mains Outage Log. By dragging the split box (I) down to the middle (H), you can browse the log in two different panes.

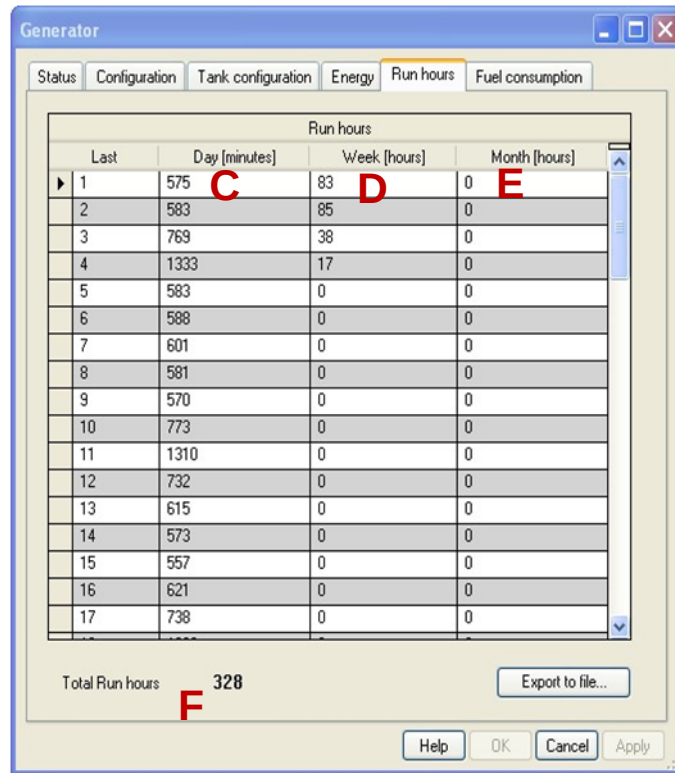
Clicking on the “**Export to file**” button, enables to save the log in XML format to a computer.

Read more in topic “[Generic about Measurement Logs](#)”, page 232.

Read also topic [Mains Outage tab](#) (page 69) in the *PowerSuite* Help section.

Generator Run Hours Log

The Generator Run Hours Log is a *measurement log*, and represents an efficient way of logging **how long time the gen-set has being ON**, or running.



This figure shows an example of *PowerSuite* dialog box with the Generator Run Hours Log.

The Generator Run Hours Log displays **how long time the gen-set has being ON**, or running during **the last day**, in minutes (C); and during the **last week** (D) and the **last month** (E), in hours.

It also displays **how long time** the gen-set has being ON, or running since the first **system start-up** (F).

The system controller stores the **latest 52 sets of measurements** or calculations, which can be displayed by the Generator Run Hours Log.

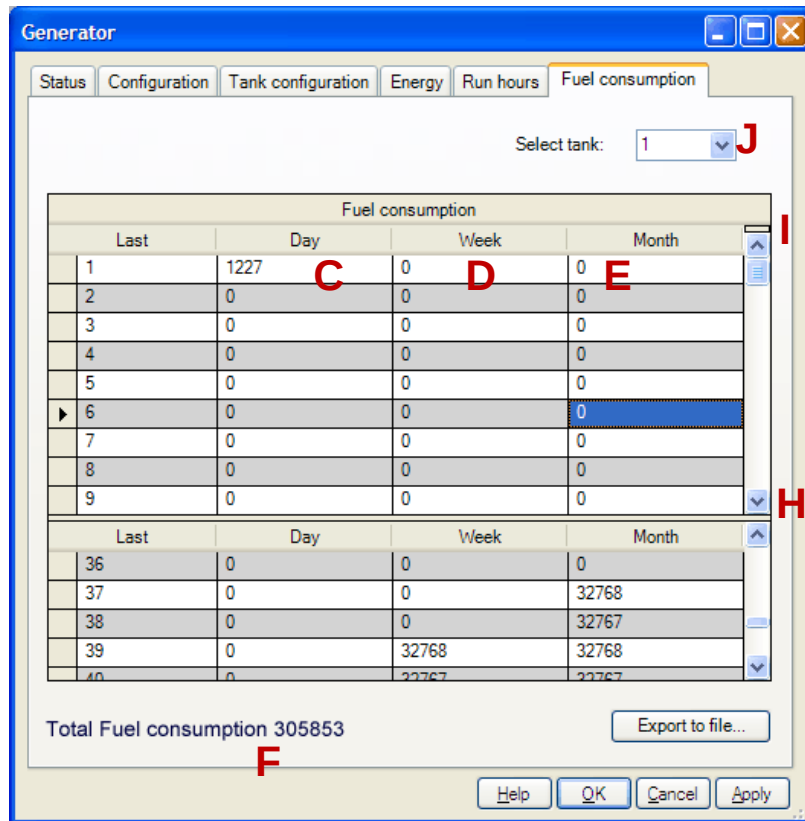
Clicking on the “**Export to file**” button, enables to save the log in XML format to a computer.

Read also topic [Generator Run Hours tab](#) (page 80) in the *PowerSuite* Help section.

Read more in topic “[Generic about Measurement Logs](#)”, page 232.

Generator Fuel Consumption Log

The Generator Fuel Consumption Log is a *measurement log*, and represents an efficient way of logging **how much diesel the gen-set has consumed**.



This figure shows an example of *PowerSuite* dialog box with the Generator Fuel Consumption Log.

The system stores a fuel **consumption log for each fuel tank (J)**, based on the entered tank configuration data. The fuel consumption is displayed in liters, gallons or any other **suitable volume unit**.

As recommended, the used units should be included in the tank description name. See topic “[Step 9- Configure the fuel tank](#)” on page 273.

The Generator Fuel Consumption Log displays **how much fuel the gen-set has consumed during the last day (C)**, during the **last week (D)** and during the **last month (E)**.

It also displays **how much fuel** the gen-set has consumed since the first **system start-up (F)**.

The system controller stores the **latest 52 sets of measurements** or calculations, which can be displayed by the Generator Fuel Consumption Log. By dragging the split box (I) down to the middle (H), you can browse the log in two different panes.

Clicking on the “**Export to file**” button, enables to save the log in XML format to a computer.

Read also topic [Generator Fuel Consumption tab](#) (page 81) in the *PowerSuite* Help section.

Read more in topic “[Generic about Measurement Logs](#)”, page 232.

Battery Discharge Cycles Log

The “Battery Discharge Cycles Log” is a *measurement log*, and represents an efficient way of logging the **performed battery cycles** on the system’s battery bank.

In general, every time a battery is charged and discharged, it uses **one battery cycle**. The battery cycle life is measured by how often it can be charged and discharged.

To improve the monitoring of the cycles, the controller implements a configurable “**Discharge Cycle Threshold**” of X% of charge (SOC), which is a hysteresis value for the controller to ignore small current variations from discharging to charging or vice versa.

Thus, the **controller counts one “Discharge Cycle”** when the battery has being discharged more than X% (of full charge), and then recharged with more than X% (of full charge).

The “Discharge Cycle” counter is disabled, if the threshold X% is configured as 0%.

Read more in the example in topic “[Battery Cycles Diagram](#)” on page 240.

The controller counts and logs the number of performed battery cycles during the **last day**, during the **last week** and during the **last month**.

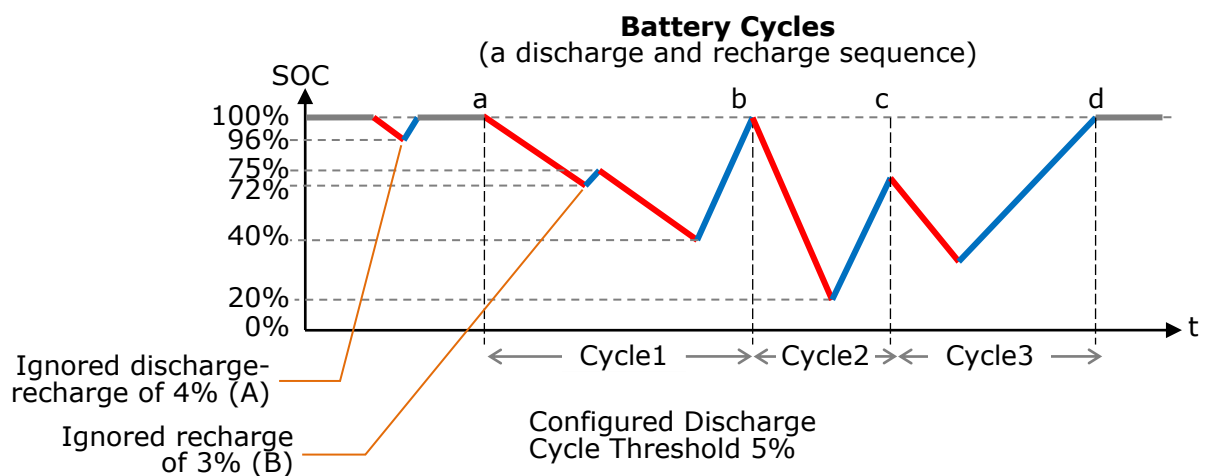
Also, the controller counts the **total number of battery cycles** performed since the first system start-up.

The system controller stores the latest 52 calculations, which can be displayed by the “Battery Discharge Cycles Log”.

Read more in topic [Discharge Cycles tab](#) (page 125) in the *PowerSuite Help* section, and in topic “[Generic about Measurement Logs](#)”, page 232.

Battery Cycles Diagram

The Battery Cycles diagram below illustrates how the controller counts performed battery cycles, with regard to a configured “Discharge Cycle Threshold” of 5% of full charge.



This diagram shows that the controller counts 3 cycles during this period of time, with a configured Discharge Cycle Threshold of 5%

At the beginning, the diagram shows **an ignored “battery cycle” (A)**, as the battery is discharged to 96% SOC (4% of full charge) and recharged back to 100% of full charge, which is less than the configured 5% threshold.

During Cycle1 (a-b), for a short period of time, the battery is recharged from 72% to 75% SOC (3% of full charge) **(B), which the controller also disregards** as it is less than the configured 5% threshold.

During Cycle2 (b-c), the battery is discharged to 20% SOC (or 80% DOD), and then recharged to approx. 73% SOC, before the battery is again discharged in cycle3.

During Cycle3 (c-d), the battery is discharged from approx. 73% SOC to 30% SOC, and then recharged back to 100% SOC.

Alarm Messages, (Log)

You can browse through the stored system alarm messages,

In *Compack*-based systems, via:

- The *WebPower* configuration web pages
- The *PowerSuite* application

In *Smartpack*- and *Smartpack2*-based systems, via:

- The *WebPower* configuration web pages
- The *PowerSuite* application
- The controller’s front keys

From the Smartpack2 Master Controller’s Front

You can display a log of active system alarm messages by selecting, via the *Smartpack2 Master* controller’s front keys:

Logs/Report > **Active Alarms**

#	Description	Value	Limit	Alarm Group	Output	Note
	BatteryTemp 1.1	42	30	----	---	
	SymmVolt 1.1	12,91	1,50	Alarm Group 15	----	
	RectifierError	1	1	Minot Alarm	-----	

From the Smartpack Controller’s Front

You can browse through the stored system alarm messages (alarm log) by selecting “**UserOption > DisplayMessages**”, via the *Smartpack* controller’s front keys.

The *Smartpack* controller’s alarm log stores several hundred chronological events (depending on controller’s firmware). Each log entry contains event text, event action, time and date. When the log is full, the oldest value is overwritten. The log is stored in EEPROM.

From PowerSuite

Refer to [“Types of System Logs”](#) on page 230.

From Configuration Web Pages

By clicking on the “**Event Log**” button, on the *home page* toolbar, you can also display a log of power system events automatically registered by the system controller

Alarm Reset

The DC power system can be configured with *automatic* or *manual* alarm reset.

When **Manual Alarm Reset** is enabled -- and the alarm condition no longer exists -- the operator **must reset the alarm manually**, via the power systems user interface (web GUI or controller’s front keys).

When the Manual Alarm Reset is disabled, then the **Automatic Alarm Reset** is enabled (default). In this case, when an alarm condition no longer exists, the **main controller will automatically reset the alarm**, by deactivating the alarm lamps and relays to indicate that normal operation is established.

Power System’s Operation Mode

The DC power system may be in *normal condition* or in *critical condition*.

Usually, a system is in *critical condition* after a Mains outage or when the battery voltage is too low. When the system is not in critical condition, it functions in a *normal condition*.

When in normal condition, the DC power system may function in three operational modes:

- *Float Mode*
- *Test Mode*
- *Boost Mode*

The active operational mode is always displayed on *PowerSuite*’s status bar.

Test and *Boost* operation modes are NOT permitted, when the power system is in a *critical condition*. Also, in general, the LVD latching contactors may ONLY be disconnected while in *critical condition*, and reconnected when NOT in *critical condition*.

Read also [“LVBD - Battery Protection”](#) on page 320.

The power system’s outputs -- voltage or voltage free (relay contacts) -- can be either in a *Normal State* or in *Alarm State*.

Configuration of Critical Condition

Using *PowerSuite*, you can configure which of the four following circumstances (monitors in alarm) the DC power system has to encounter for the system to be in *critical condition*.

- A. *MainsLow* alarm is ON (one or several phases fail)
- B. *Battery Current Minor Low* alarm is ON

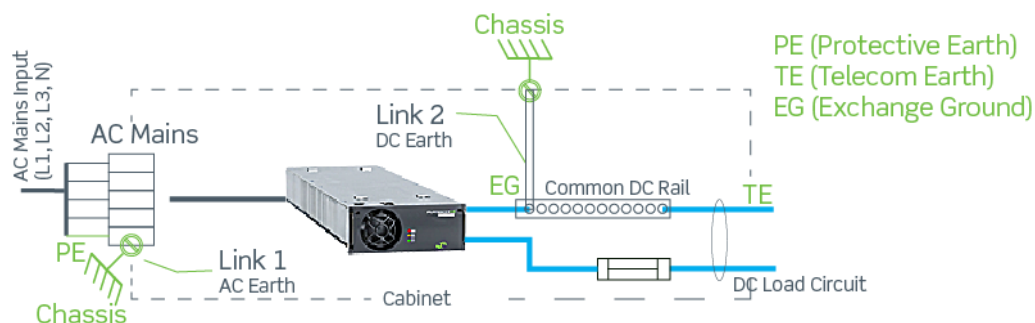
- C. When alarm
“A” OR “B” above is ON
- D. When alarms
“A” AND “B” above are ON

Refer also to *PowerSuite’s* System Configuration dialog box topic.

About AC, DC Earthing Systems

To prevent the risk of electric shock, all cabinet’s chassis are to be electrically connected to AC Earth (PE). Also, it is a common practice for telecom equipment to have its common DC output rail (+ or –) connected to a separate “Telecom Earth” (TE) or DC Earth.

Earth connections are in particular important where frequent lightning might induce high voltage levels in AC supply and in battery and load cables.



At factory, AC Earth (PE) and DC Earth (TE) are connected to chassis. Remove “Link 2” (“floating earth”) for compliance with other local earthing systems.

TN, TT and IT Networks

The international standard IEC 60364 differentiates three earthing systems for electricity supply networks, using two-letter codes TN, TT and IT.

The **first letter** indicates the connection **between earth** and the **power supply equipment** (generator or transformer):

- “T” stands for direct connection of a point with earth (Latin: Terra)
- “I” means that no point is connected with earth (Isolation), except perhaps via a high impedance.

The **second letter** indicates the **connection between earth** and the **electrical device** being supplied:

- “T” means direct connection of a point with earth
- “N” means direct connection to Neutral at the origin of installation, which is connected to the earth

TN networks

The TN earthing system, where one of the points in the generator or transformer is connected with earth, usually the star point in a three-phase system. The body of the electrical device is connected with earth via this earth connection at the transformer.

The conductor that connects the exposed metallic parts of the consumer is called *protective earth (PE)*. The conductor that connects to the star point in a three-phase system, or that carries the return current in a single-phase system, is called *neutral (N)*.

TT networks

In a TT earthing system, the protective earth connection of the consumer is provided by a local connection to earth, independent of any earth connection at the generator.

The **big advantage** of the TT earthing system is the fact that it is **clear of high and low frequency noises** that come through the neutral wire from various electrical equipment connected to it. This is why TT has always been **preferable for special applications like telecommunication sites** that benefit from the interference-free earthing. Also, TT does not have the risk of a broken neutral.

In locations where power is distributed overhead and TT is used, installation earth conductors are not at risk should any overhead distribution conductor be fractured by, say, a fallen tree or branch.

In pre-RCD era, the TT earthing system was unattractive for general use because of its worse capability of accepting high currents in case of a live-to-PE short circuit (in comparison with TN systems). But as residual current devices mitigate this disadvantage, the TT earthing system becomes attractive for premises where all AC power circuits are RCD-protected.

IT networks

In an IT network, the distribution system has no connection to earth at all, or it has only a high impedance connection. In such systems, an insulation monitoring device is used to monitor the impedance

Earth Fault Detection

All power systems that use any of the *Smartpack2 Basic* controllers, or newer *Eltek's* controllers, have Earth Fault Detection functionality built-in the controller.

WARNING:

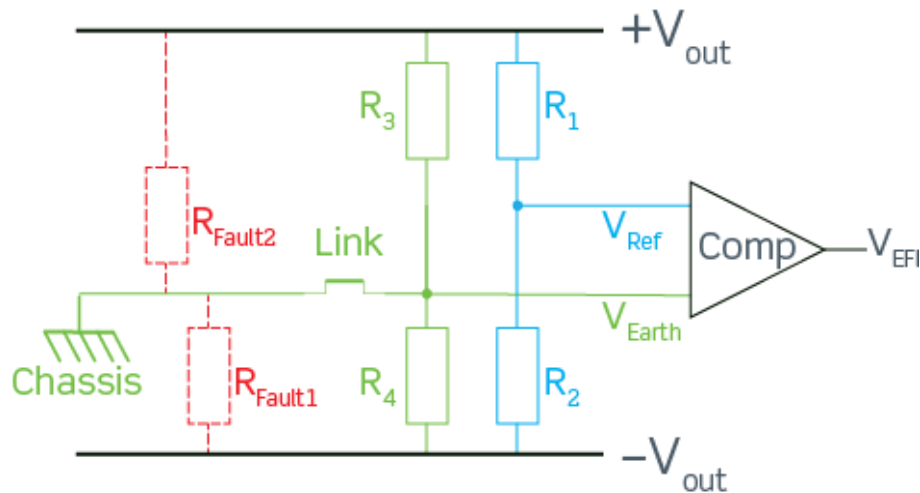
To be able to use the Earth Fault Detection functionality, the power system must be implemented with “floating earth”, which means that “Telecom Earth” (TE) or DC Earth must NOT be connected to the power system’s DC output rail (+ or –).

Read more in topic “[About AC, DC Earthing Systems](#)” on page 243

The Earth Fault Detection functionality requires no external wiring, but it is disabled by default, and must be activated in the controller via the *PowerSuite* configuration program.

Earth Fault Detection Scheme

In “floating earth” supply systems, the ground-to-supply conductor (+ or –) impedance is always high. Earth faults in the system tend to reduce the ground-to-supply conductor impedance, and will cause earth leakage currents that flow to chassis.



The Earth Fault Detection function is based in a device that compares the ground (chassis) voltage (V_{Earth}) with a reference voltage (V_{Ref}).

When no earth fault is present (R_{Fault1} and $R_{Fault2} \approx \infty$), then $V_{Earth} = V_{Ref}$ and the device output $V_{EFI} = 0$.

When an earth fault is present (and R_{Fault1} or $R_{Fault2} < R_{Limit}$) — there is a current leakage from the supply conductor (from + or – or both) to ground. Consequently, $V_{Earth} \neq V_{Ref}$ and the device output $V_{EFI} \neq 0$, causing the controller to activate an earth fault alarm.

Notice that even if there is an earth fault, the controller will not raise an alarm, as long as R_{Fault1} and R_{Fault2} are higher than R_{Limit} , which you must configure in e.g. *PowerSuite*.

WARNING:

When the power system is implemented with more than one *Smartpack2 Basic* controllers, you must remove the jumper “Link” (see diagram) from inside ALL the *Smartpack2 Basic* controllers but one.

Configuration of Earth Fault Detection

The Earth Fault Detection functionality in the controller is disabled by default, but you can activate it when suitable to your power system.

Using e.g. the *PowerSuite* configuration program (in the “SP2 Basic” dialog box, the “Earth Fault” tab), you must enable the function, configure the earth fault alarm limit (R_{Limit}) and calibrate the Earth Fault Detection circuitry.

Read how to configure this function in topic [Control Unit Earth Fault tab](#) (page 158), in *PowerSuite Online Help*.

Read about how to calibrate this function in topic “[Calibration - Earth Fault Detection](#)” on page 229.

Earth Fault Detection Accuracy

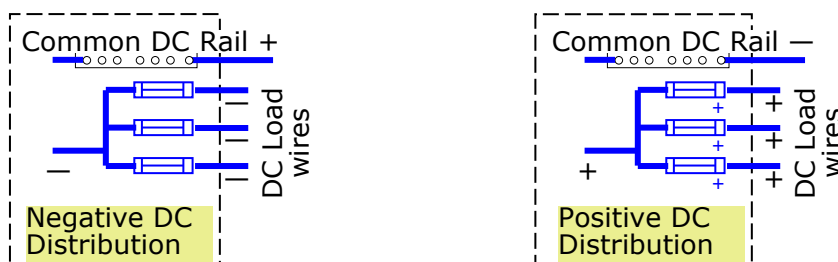
The Earth Fault Detection functionality built-in the *Smartpack2 Basic* controllers can be used to raise an earth fault alarm, when the impedance *ground-to-positive supply conductor* is not the same as the impedance *ground-to-negative supply conductor*. This situation will occur when there is current leakage from the supply conductor (from + or – or both) to ground.

Even though the Earth Fault Detection circuitry is software-compensated to adjust to different systems' scenarios, the function is not accurate enough to measure the exact ground-to-supply conductor impedance, because the power system may contain many parameters that will affect the accuracy, such as:

- The system's DC output voltage (-48V, 60V, 110V, etc.)
- The connection of current shunts in the positive or the negative supply conductors
- Situations where there is current leakage from both + and – supply conductors to ground
- Inadequate calibration schemes

For example, you *cannot* use the Earth Fault Detection functionality to raise an alarm when the earth current leakage exceeds exactly 30mA.

About Negative & Positive DC Distribution Systems



Common Positive (+) DC Output Rail is usual in 48 and 60V DC supply systems: **Negative DC Distribution**.

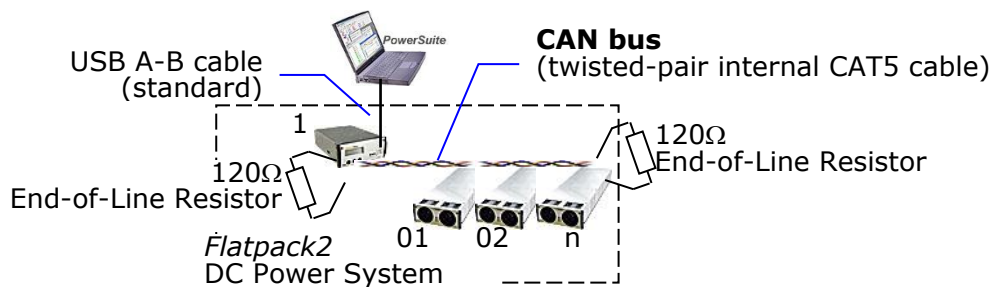
Common Negative (–) DC Output Rail is usual in 24V systems: **Positive DC Distribution**.

CAN bus Termination

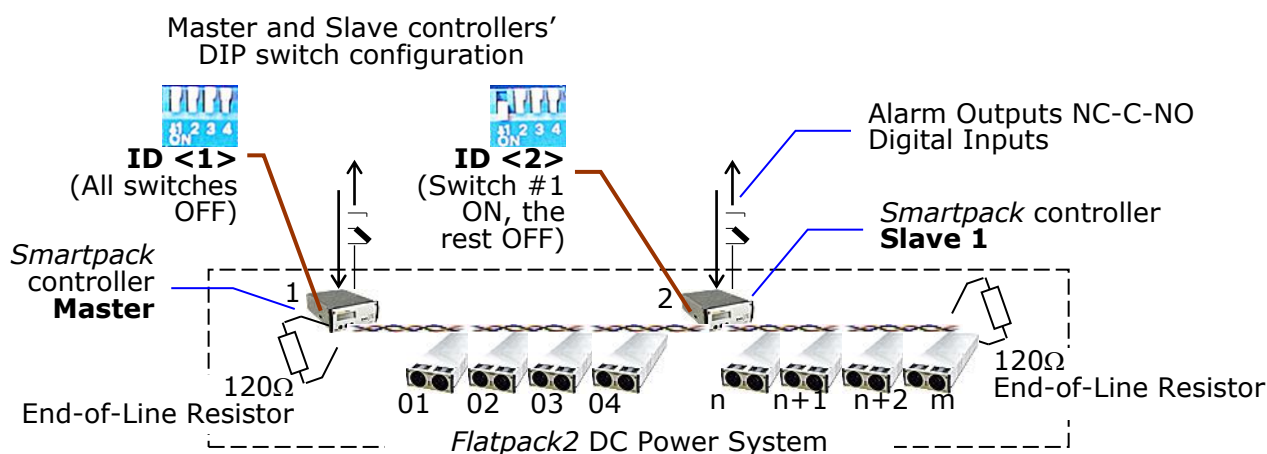
To ensure a correct bus communication and avoid data reflection, you must always terminate the CAN bus with two 120Ω resistors at both ends of the line (60Ω bus impedance). The CAN bus is connected using CAT5 twisted-pair cables.

Read also topic "[CAN bus Addressing](#)" on page 345.

The figure below shows a generic *Flatpack2* DC power system, with the CAN bus terminated with a 120Ω resistor on both line ends (60Ω bus impedance).

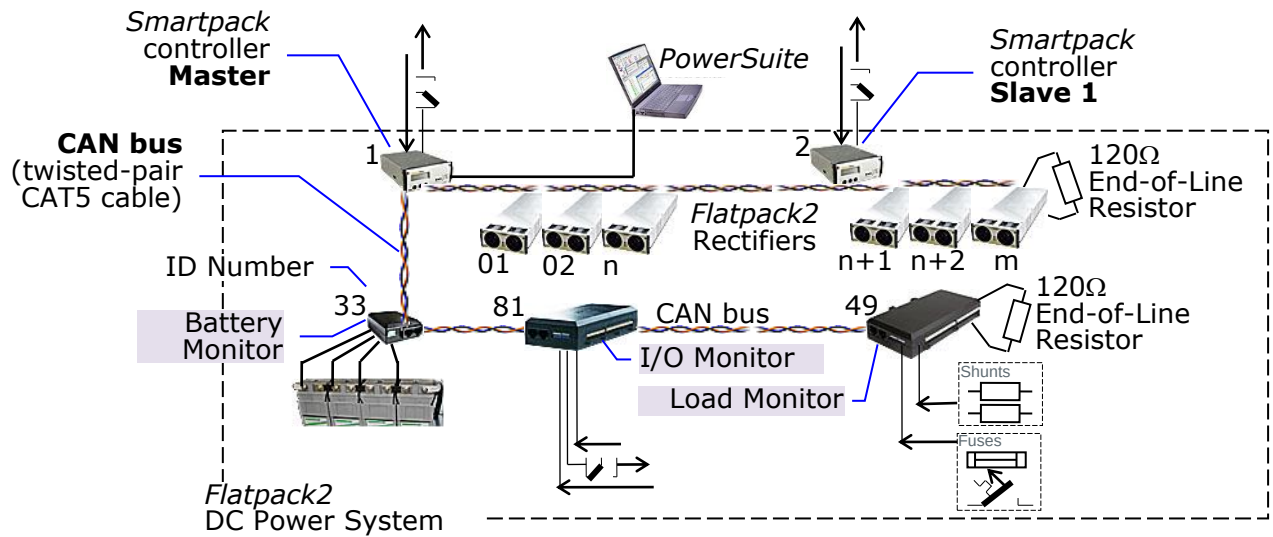


The figure below shows a *Flatpack2* DC power system expanded with a slave controller to implement additional digital inputs, relay outputs or similar functionality. The CAN bus is terminated with a 120Ω resistor on both line ends (60Ω bus impedance).



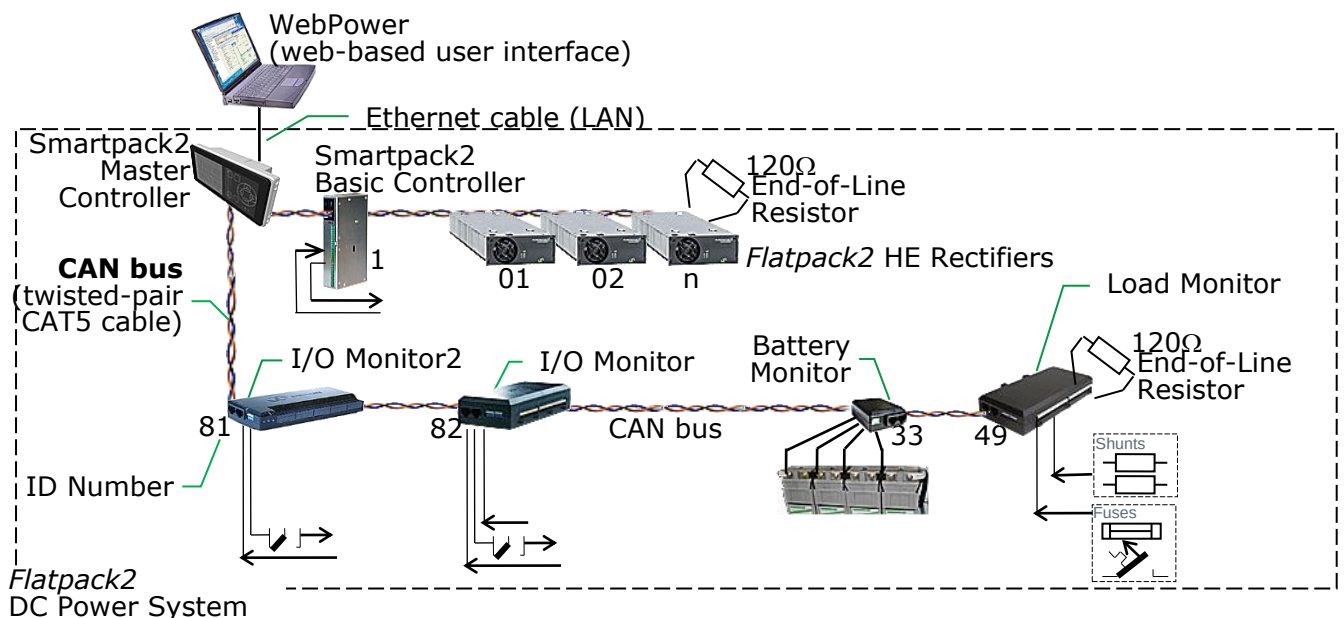
The figure below shows a *Flatpack2* DC power system expanded with a slave controller and 3 CAN bus Nodes to implement additional relay outputs and digital inputs (for current and fuse monitoring, temperature and fan speed control & monitoring or similar functionality). The CAN bus is terminated with a 120Ω resistor on both line ends (60Ω bus impedance).

The 3 CAN Bus nodes connected are: a Battery Monitor (ID#33), an I/O Monitor (ID#81) and a Load Monitor (ID#49).



The figure below shows a *Flatpack2* DC power system with *Smartpack2*-based control system and 4 CAN nodes, to implement additional digital inputs, relay outputs or similar functionality. The CAN bus is terminated with a 120Ω resistor on both line ends (60Ω bus impedance).

The 4 CAN Bus nodes connected are: an I/O Monitor2 (ID#81), an I/O Monitor (ID#82), a Battery Monitor (ID#33) and a Load Monitor (ID#49).



When connecting more CAN nodes to the bus, you have to remove the CAN bus termination plug from one of the CAN bus ends, and plug it in one of the CAN ports on the last connected CAN node.

Climate Control Functions - Outdoor Cabinets

This section describes the DC power system's climate control functionality implemented in fan-cooled outdoor cabinets.

Eltek's power systems installed in fan-cooled outdoor cabinets are equipped with the *I/O Monitor* (T1) or the *I/O Monitor3* (T3) CAN bus node.

These *I/O Monitors* have input and output signals to monitor and control the fan speed and the compartment temperature and humidity inside fan-cooled outdoor cabinets. Also, they can raise alarms when the cabinet's fan filters are clogged, so that they can be replaced with new ones.

Read more about these monitors in topic "[The I/O Monitor Control Unit \(T1\) - Overview](#)" on page 361.

Following climate control functionality is available:

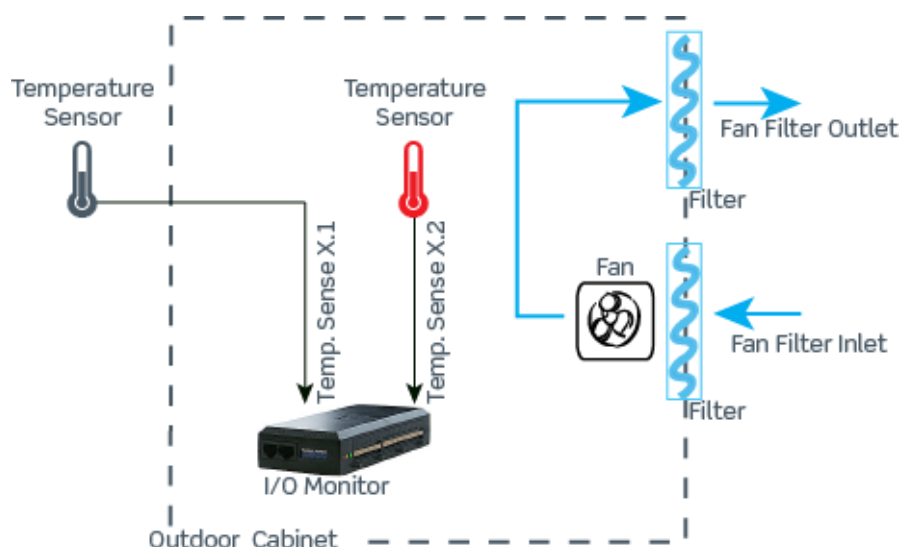
In short:

- Temperature Monitoring – Internal and External
- Fan Speed Control and Monitoring – PWM
- Fan Speed Control – ON/OFF
- Fan Filter Monitoring – Pressure Test
- Humidity Reduction Control

More Detailed:

Temperature Monitoring – Internal and External

The two inputs "**Temperature Sense X.1**" and "**Temperature Sense X.2**", in the the *I/O Monitor* T1 and T3, are designed to be used with the AD590 series of temperature sensors, e.g. to monitor the temperature inside and outside of fan-cooled outdoor cabinets.



Alarm Monitors

The measured temperatures on these two inputs are continuously monitored by *PowerSuite's* alarm monitors "**OutDoorTempX.1**" and "**OutDoorTempX.2**".

The *I/O Monitor* uses this information to raise alarms and take climate control “decisions”.

Also, the alarm monitor “TempDevX.Y” compares the deviation between the internal temperature source ($T_{Int}^{\circ}C$) and the external temperature source ($T_{Ext}^{\circ}C$). If the deviation ($\pm T_D^{\circ}C$) is higher than the configured alarm limit ($T_{Lim}^{\circ}C$), the *I/O Monitor* generates an alarm.

$$(T_{Ext}^{\circ}C - T_{Int}^{\circ}C) = T_D^{\circ}C \quad T_D^{\circ}C > T_{Lim}^{\circ}C \rightarrow \text{alarm}$$

Refer also the “[Control Unit Outdoor tab](#) (page 156)” topic in *PowerSuite Help*.

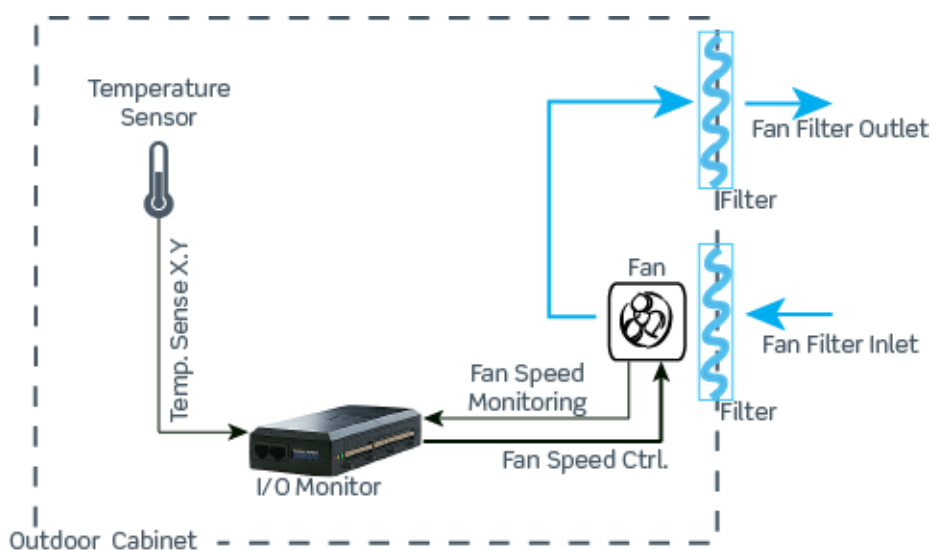
Fan Speed Control and Monitoring – PWM

The two outputs “**Speed Control Output 1**” and “**Speed Control Output 2**”, in the the *I/O Monitor* T1 and T3, are designed as Pulse-Width-Modulation (PWM) outputs, to individually control the speed of two independent fans.

Warning:

To prevent damaging the *I/O Monitor*’s Speed Control Outputs, do not connect clamping diodes directly on the fans’ control inputs. Also, the input impedance of the fans’ control inputs must be 10K Ω or greater.

The two inputs “**Tachometer Input 1**” and “**Tachometer Input 2**” are developed to monitor the rotational speed of two individual fans.

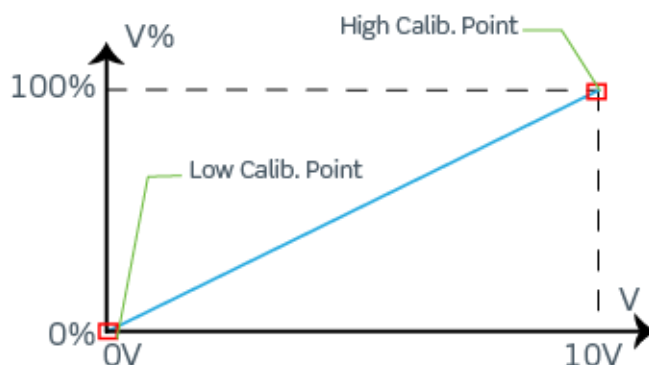


The block diagram shows the *I/O Monitor* inside a fan-cooled outdoor cabinet, controlling the fan speed via “Speed Control Output 1”, monitoring the fan speed via “Tachometer Input 1” and the internal temperature via “Temperature Sense 1”

The outputs can be configured to give a linear control signal from 0V (0% fan speed) to 10V (100% fan speed).

Fan Speed Control

Velocity vs. Voltage

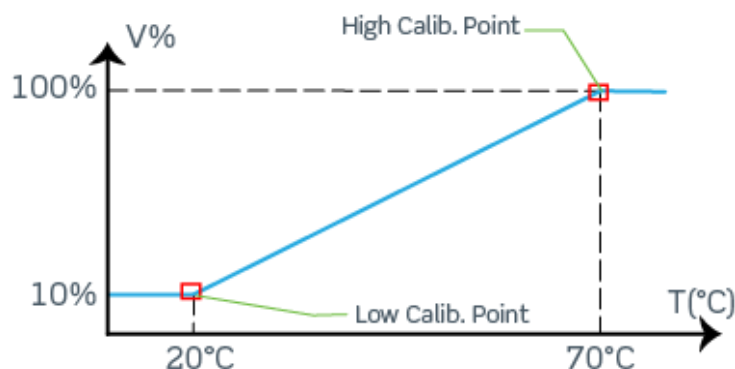


The fan speed (V%) is displayed as a percentage of the maximum speed. In order to convert the signal frequency on the tachometer inputs to the correct percentage speed, the inputs must be configured with the number of pulses per revolution (ppr) and with the maximum fan speed (rpm).

The *I/O Monitor* controls the **fan speed according to the temperature** measured by the selected temperature sense inputs.

Fan Speed Control

Velocity vs. Temperature



The *I/O Monitor* is configured with the low and high fan speed values, that you want the fan to run at the specified temperatures.

For example, setting the Low and High Calibration Points to 20°C-10% and 70°C-100% will make the fan to run at 10% speed until the temperature reaches 20°C, then the speed will increase linear for increasing temperatures, and run at 100% speed when the temperature reaches 70°C and above.

NOTICE:

To avoid that a factory reset may cause the fans to rotate too slow, the fan speed is configured from factory with the same speed for the low and high speed values (20°C -50% speed) (70°C -50% speed).

Alarm Monitors

Configuration and calibration of the installed fan is entered in *PowerSuite*'s alarm monitors "FanControl X.Y" (for the fan speed control output), and in alarm monitor "FanSpeed X.Y" (for the speed monitoring input).

Alarm monitor "SpeedDev X.Y" compares the deviation between the theoretical fan speed ($V_{Th}\%$, outputted by "FanControl X.Y" and displayed in the Outdoor tab) with the real fan speed ($V_R\%$, monitored by "FanSpeed X.Y").

If the deviation ($\pm V_D\%$) is higher than the entered speed limit ($V_{Lim}\%$), the *I/O Monitor* generates an alarm.

$$(V_{Th}\% - V_R\%) = V_D\% \quad V_D\% > V_{Lim}\% \rightarrow \text{alarm}$$

Refer also the "[Control Unit Outdoor tab](#) (page 156)" topic in *PowerSuite Help*.

Fan Speed Control – ON/OFF

The *I/O Monitor*'s relay outputs 5 and 6 have higher contacts rating, and are suitable for fan control and other current demanding equipment. For example, they can be used for driving external control relays for switching the fans ON/OFF, instead of using the PWM Speed Control Outputs.

The fan is then either turned ON ($V=100\%$) or turned OFF ($V=0\%$).

Requirements

When using this type of ON/OFF fan speed control, you must carry out the following in *PowerSuite*:

- Create three logical Alarm Output Groups (AOG1, AOG2, AOG3), assign the *I/O Monitor*'s relay outputs 5 and 6 to AOG3, and configure following logic:

```
AOG1ALA (door open) OR AOG2TEMP-INT <20C
THEN ==>> AOG3NOR (RL5&RL6 are OFF; Fan is OFF)
```

```
AOG1NOR (door closed) AND AOG2TEMP-INT >20C THEN ==>>
AOG3ALA (RL5&RL6 are ON; Fan is ON)
```

- Connect and configure an spare *I/O Monitor*'s **programmable input**, to monitor when the **cabinet's door** is open or closed, and to activate AOG1
- Connect and configure one of the *I/O Monitor*'s **temperature sense inputs**, to monitor the cabinet's **internal temperature**, and to activate AOG2

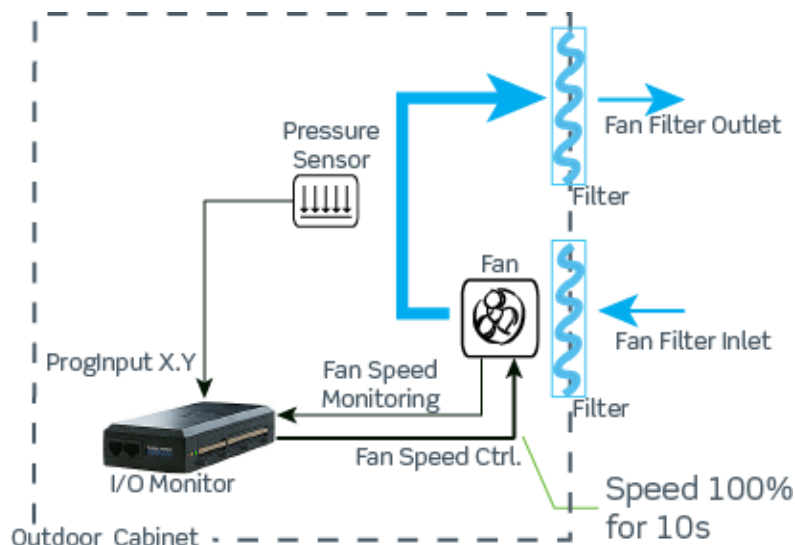
Refer also the "[Control Unit Outdoor tab](#) (page 156)" topic in *PowerSuite Help*.

Fan Filter Monitoring – Pressure Test

The *I/O Monitor* implements functionality to test and monitor the outdoor cabinet's fan filters, and raise an alarm when they are dirty or clogged and are to be replaced by new ones.

The fan filters monitoring is performed by automatically running **Pressure Tests inside of the cabinet** at specified intervals.

The Pressure Test will create a higher pressure inside the cabinet, when the fan filters are dirty than when the fan filters are clean.



Requirements

When using the Pressure Test function, you must carry out the following:

- Connect a **pressure sensor** inside the cabinet, and configure it so that the sensor's relay output is in alarm, when the pressure inside the cabinet is above a certain level P_{LIMIT} (x Pascal), which will indicate that the filters are to be replaced
- Connect and configure in *PowerSuite* a spare *I/O Monitor's* **programmable input**, to monitor when the pressure sensor's output is activated

NOTICE:

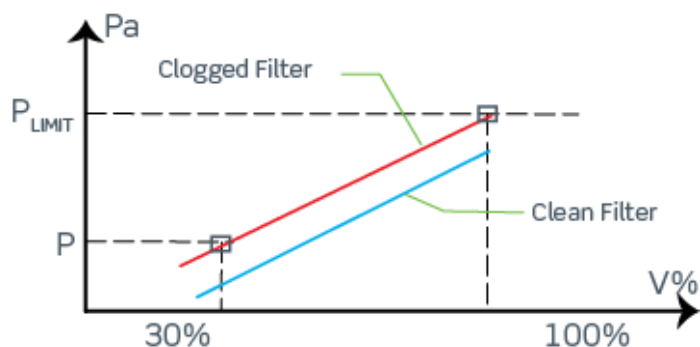
Do not select the *I/O Monitor's* programmable input 1 (ProgInput X.1) for the Pressure Test, when the Humidity Reduction function also is enabled.

How it works

When enabled, the *I/O Monitor* will run a Pressure Test at the date and time specified. The test will be run repeatedly at the specified time intervals (a number of days).

Outdoor Cabinet's Filter Test

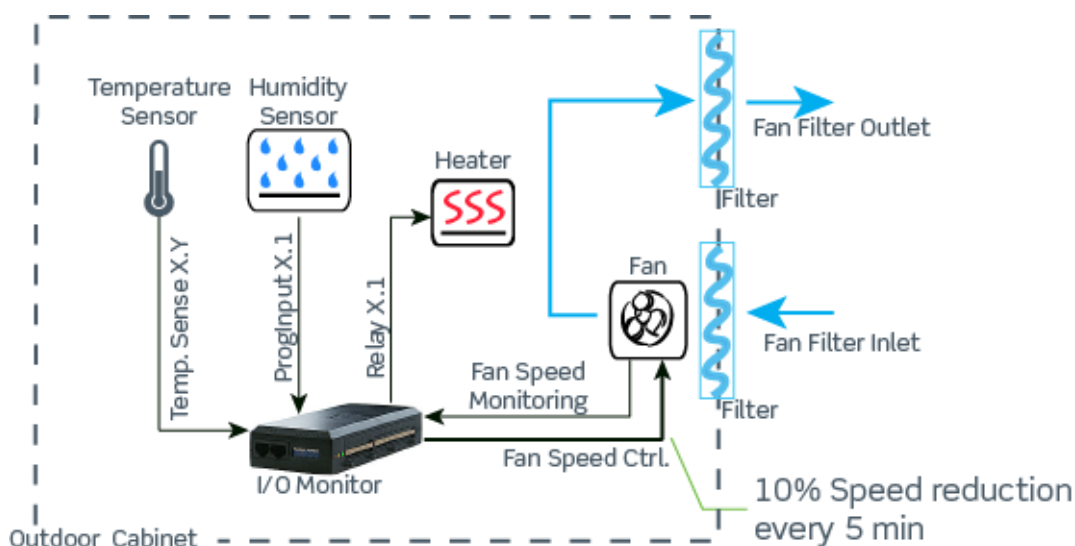
Pressure (P) vs. Velocity (V%)



When the cabinet's pressure during a test increases above the configured level P_{LIM} (x Pascal), the *I/O Monitor* will raise a "clogged filters" alarm.

Humidity Reduction Control

The Humidity Reduction functionality is suitable, when you want *I/O Monitor* to automatically attempt to reduce the amount of water vapor in the air inside the outdoor cabinet.



When using the Humidity Reduction function, you must carry out the following:

- Connect a **humidity sensor** inside the cabinet, and configure it so that the sensor's relay output is in alarm, when the humidity inside the cabinet is above an accepted level H_{ON} , at which you want the *I/O Monitor* to start attempting to reduce the humidity in the air
- Connect and configure in *PowerSuite* the *I/O Monitor's* **programmable input 1** (ProgInput X.1) to monitor when the humidity sensor's output is activated
- Install a **heater device** inside the cabinet, and connect it so that it is controlled (turned ON and OFF) by the *I/O Monitor's* **alarm relay output 1**

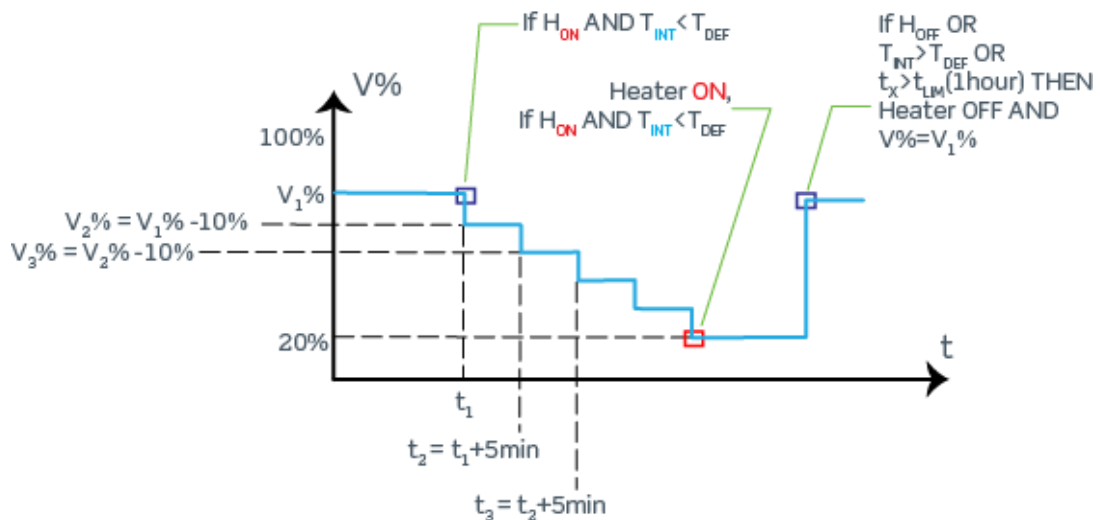
How it works

When enabled, the *I/O Monitor* will monitor the humidity sensor (via ProgInput X.1) and the cabinet's internal temperature (via Temperature Sense Input X.Y").

Humidity Reduction Control

Fan's Velocity (V%) vs. Time (t)

Humidity Sensor (H_{ON} - H_{OFF}), Temperature Sensor (T_{INT}) and Heater
 $T_{DEF}=50^{\circ}\text{C}$, $t_{LM}=1\text{ hour}$



The configuration is as follows:

- The internal Temperature Sense Input is configured with a default temperature ($T_{DEF}^{\circ}\text{C}$) of 50°C
- The duration of the cycle of the Humidity Reduction function is configured to last 1 hour (t_{LIM})
- The humidity sensor is configured to the limit of the accepted humidity level (H_{ON}).

The Humidity Reduction logic is as follows:

- **Humidity alarm ON → Fan speed reduction**

IF the humidity sensor is activated (H_{ON})
 AND
 the cabinet's internal temperature ($T_{INT}^{\circ}\text{C}$) is lower than the configured default temperature ($T_{DEF}^{\circ}\text{C}$),
 e.g. ($T_{INT}^{\circ}\text{C} < 50^{\circ}\text{C}$),

THEN
 the *I/O Monitor* will **reduce the fan's speed with 10% every 5 minutes**,
 UNTIL
 either the humidity sensor is deactivated (H_{OFF})
 OR
 the internal temperature increases to 50°C
 ($T_{INT}^{\circ}\text{C} \geq T_{DEF}^{\circ}\text{C}$)
 OR
 the fan's speed has been reduced to 20% speed level.

- **Humidity alarm still ON → Heater ON**

IF the fan's speed has been reduced to 20% speed level
 AND
 the humidity sensor is still activated (H_{ON})
 AND
 the cabinet's internal temperature ($T_{INT}^{\circ C}$) is still lower than the configured default temperature ($T_{DEF}^{\circ C}$),
 e.g. ($T_{INT}^{\circ C} < 50^{\circ C}$),
 THEN
 the *I/O Monitor* will **start the heater**, using the Alarm Relay Output X.1

- **Humidity alarm OFF → Heater OFF**

IF the humidity sensor turns to normal status again (H_{OFF})
 OR
 the cabinet's internal temperature ($T_{INT}^{\circ C}$) increases to $50^{\circ C}$ ($T_{DEF}^{\circ C}$),
 e.g. ($T_{INT}^{\circ C} \geq T_{DEF}^{\circ C}$),
 OR
 the Humidity Reduction function has been active longer than 1 hour (t_{LIM})
 THEN
 the *I/O Monitor* will **stop the heater**, using the Alarm Relay Output X.1
 AND
 restore the fan speed to normal ($V_1\%$)

Refer also the "[Control Unit Outdoor tab](#) (page 156)" topic in *PowerSuite Help*.

Mains Functions

This section describes functions related to the DC power system's AC Mains input.

Mains Phase Assignment versus Rectifier ID

In systems with 3 phase AC feed, the controller can be configured to report a warning if one phase fails, and to report an alarm if two phases fail, for example.

The 230V phases of the power systems' Mains AC Feed are routed to the rectifiers' inputs in a special pattern that loads the 3 phases evenly. The routing of the phases is implemented via internal wiring and the use of **4AC Power Shelves** or **2AC Power Shelves** or similar shelves. Refer to your system's quick start guide and specific documentation for more information.

To be able to display correct information about the phases, the controller must "know" which phase is connected to which rectifier (ID number).

Usually, DC power systems are shipped from factory with the rectifier modules already installed in **the correct position in the power shelves**, with respect to their ID number (or CAN bus address).

This relationship is very important, as the controller always uses rectifier IDs 01 and 04 to monitor mains phase L1, rectifier IDs 02 and 05 to monitor mains phase L2 and rectifier IDs 03 and 06 to monitor mains phase L3. When both rectifiers, monitoring the same phase, report that the mains phase voltage is lower than the configured limit, then the controller broadcasts a “Mains Phase Lx” warning (one phase has failed).

For example: accidentally inserting a rectifier with ID 02 in a power shelf position internally connected to mains phase L1, will cause the controller to monitor L1 “thinking“ it monitors L2.

Generator Functions

This section describes functions related to the DC power system's AC Mains input, when supplied by an AC generator or *gen-set* (engine-generator set).

AC Generator as AC Mains

The control system's Generator functionality is a set of software functions that enables efficient monitoring and controlling of generator-fed, hybrid DC power systems.

See a diagram of a hybrid DC power system in topic "[Configuration Criteria](#)" on page 260.

The control system's Generator functionality implements following main features:

Generator Start & Stop Control

- Automatic generator start/stop, based on the discharge level of the system's battery bank
- Automatic generator start/stop, based on the system's battery voltage
- Daily and monthly periodical start & stop, based on configurable data

Generator Management

- Reduced battery charging current limitation
- Optimized implementation with adjustable parameters for: Mains delay, Stop delay, Boost charging, etc
- Fuel tank monitoring
- Log of fuel consumption
- Log of generator run time
- Log of generated and consumed energy
- Optional generator monitoring via digital inputs
- Smoother rectifiers start-up with Walk-in Time feature
- Optional delay for rectifiers start-up

You can use the controller's keypad or other GUI to configure the Generator functionality.

For example, following are the available options in the *Smartpack2 Master Controller's* submenu:

System Configuration > **Generator**

#	Description	Value	Unit/Label	Note
	Generator – Enable/Disable?	☐	Enable	
	Long Charge Time [h]	016		
	Stop Delay [min]	000		
	Mains Fail Delay [min]	005		
	Enable Boost during Charge	☐	Enable	
	Primary AIGrp (OutpToActivate)	--		Browser though registered alarm groups
	Secondary AIGrp (OutpToActivate)	--		Browser though registered alarm groups
	CapacityCtrl Start/Stop-Ena/Disa?	☐	Enable	

StartGenerator on DischLimit [%]	020	
StopGenerator on ChrgLimit [%]	090	
CurrLim controlled Stop-Ena/Disa?	☐	Enable
Generator Stop CurrLim [A]	010	
VoltageCtrl Start/Stop-Ena/Disa?	☐	Enable
StartGenerator on Voltage [V]	48,00	
StopGenerator after [h]	012	
Daily Generator Start - Ena/Disa?	☐	Enable
Sunday Start [h]	09	
Sunday Stop [h]	09	
Sunday AIGroup to activate	--	Browser though registered alarm groups
Monday Start [h]	09	
Monday Stop [h]	09	
Monday AIGroup to activate	--	Browser though registered alarm groups

---		(all weekdays)
Saturday Start [h]	09	
Saturday Stop [h]	09	
Saturday AIGroup to activate	--	Browser though registered alarm groups
Monthly GeneratorStart - Ena/Disa?	☐	Enable
Monthly - Start Time [h]	09	
Monthly - Start Day (1. start)	01	
Monthly - Start Day (2. start)	01	
Monthly AIGroup to activate	--	Browser though registered alarm groups

Read topic “[Configuration of Generator Functionality](#)” on page 262, which describes a configuration example of a hybrid power system.

Also, you find a control logic flowchart illustration in topic “[Generator Control Logic – Flowchart](#)” on page 275.

About Hybrid Systems

Conventional DC power systems for telecom equipment are fed from the AC mains grid, and typically use a battery bank as a backup during mains outages.

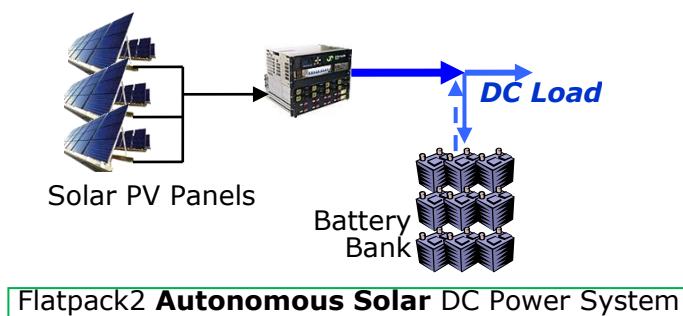
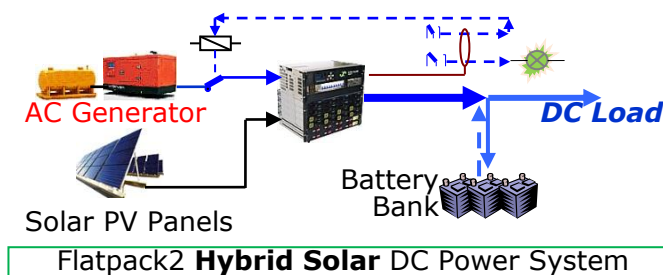
Hybrid systems use alternative energy sources, and are always fed from more than one energy source, e.g. from an engine-generator set (gen-set) and from photovoltaic solar panels (PV panels), or just from a cyclic gen-set and a suitable battery bank.

Hybrid Solar Systems are fed from more than one energy source, e.g. from photovoltaic solar panels (PV panels) and from a gen-set (and or AC mains grid). Generally, these hybrid systems also use backup battery banks.

Autonomous Solar Systems use PV panels as main energy source, with battery banks typically dimensioned for up to 5 days backup time.

Hybrid systems could be implemented with *Eltek's Smartpack2-based Flatpack2 Hybrid Power System* (AC generator-fed and Solar panels-fed), which use *Flatpack2* HE rectifiers and *Flatpack2* HE Solar converters.

Autonomous solar systems could be implemented with *Eltek's Smartpack2-based Flatpack2 Solar Power System* (Solar panels-fed), which use *Flatpack2* HE Solar converters.

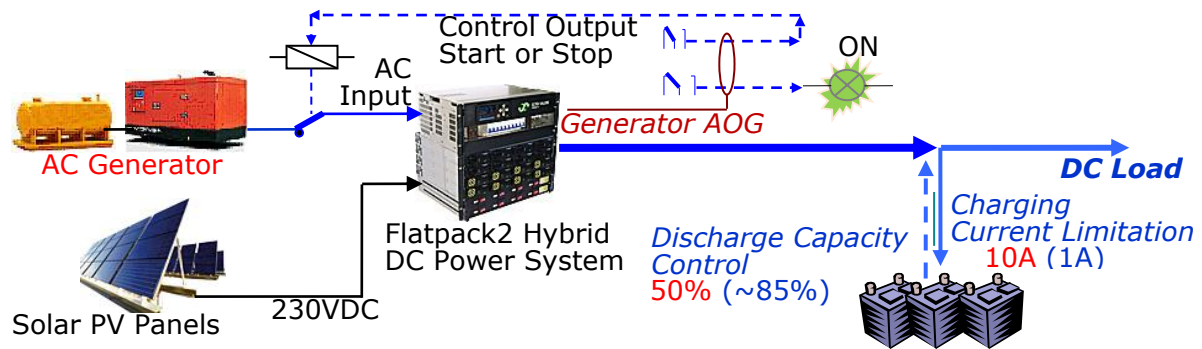


Example diagram of two systems: a *Flatpack2* Hybrid Solar Power System (fed from AC generator and Solar panels) and a *Flatpack2* Autonomous Solar Power System (fed Solar panels)

See also the diagram in topic "[Configuration Criteria](#)" on page 260.

Configuration Criteria

Following criteria is required in the configuration of the **example of the hybrid system** below:



Example diagram for a *Smartpack2*-based *Flatpack2* Hybrid Power System (fed from AC generator and PV solar panels) implemented with *Flatpack2* HE rectifiers and *Flatpack2* HE Solar converters

Diesel Engine Considerations

Ideally, diesel engines should run at 70-90% of the engine's maximum rated capacity, thus achieving **highest efficiency**. The gen-set efficiency is measured by the delivered energy per consumed litre of diesel (kWh/l).

When running with **too small loads**, the engine combustion is poorer, causing soot and clogging, which results in frequent servicing and **increased operating cost** (OPEX).

The **gen-set** should be **dimensioned** so that the sum of the total DC load current and the maximum battery charging current loads the gen-set to 70-90% of its capacity.

The lifetime of a battery (cycle life) is a function of the executed number of battery cycles, discharge level (DOD), temperature, etc., as specified in the battery's datasheet.

Select to **start the gen-set** at a combination of the below described criteria that gives the **best total cost of ownership** (TCO).

Capacity Criteria

The hybrid system is supplied from the photovoltaic solar panels (PV panels) during the daytime.

Based on this hybrid system's type of batteries, we want the controller to automatically **start the generator**, if the batteries discharge level has reached the limit (e.g. **50% DOD**), which could happen during cloudy days. The engine-generator set (gen-set) will then help out supplying the hybrid system.

The controller will **stop the generator**, when the batteries are almost fully recharged (**~85-90% SOC**), thus avoiding that the gen-set keeps on running inefficiently.

Daily Criteria

At night, the hybrid system is supplied from the generator set.

The controller will daily and periodically start the generator at **20:00** hours and stop it at **06:00** hours.

Monthly Criteria

Twice a month, the 1st and the 15th, the controller will periodically start the generator at **22:00** hours, and will run for **16 hours**.

The engine-generator set (gen-set) will then help out supplying the hybrid system. These monthly generator starts will improve the battery health (SOH) by recharging the battery bank to **~100% SOC**.

Voltage Criteria

We want to start the generator when the battery voltage falls down to 47V, and then run the generator for 12 hours.

Generic Criteria

Based on the size of the connected gen-set, and to prioritize the DC load over the battery recharging time, the “Generator-feed **battery charging current**” is to be limited to **10A**. Read more about “[Battery Charging Current Limitation](#)” on page 317.

In addition to the battery discharge level criteria (e.g. 50% DOD), the controller will also automatically **start the gen-set** if the **battery voltage** is lower than LVBD level plus 1 volt (a safety start trigger, if the battery health is very bad, and the voltage drops before the DOD value is calculated). E.g. **45V**, if LVBD level is 44V.

In addition to the battery recharge level criteria (~85-90% SOC), the controller **stops the gen-set** when the charging current is lower than **1A (Generator Stop Current Limit)**, thus avoiding that the generator keeps on running inefficiently.

The system’s AC input is supplied by the gen-set, but to prevent the controller from restarting the gen-set repeatedly during short mains outages, the controller will start the generator e.g. **5 min** after a mains outage is detected (**Mains Delay**).

To be able to charge the battery bank a bit longer, after reaching the assigned recharge level (~85-90% SOC), the generator will run **extra 5 min**, after all the criteria to stop the generator are reached (**Stop Delay**).

To reduce the required recharging time, **battery boost charging** (increase of charging voltage) must be enabled.

To limit the load transient “seen” by the generator and avoid generator hick-up -- the “Rectifiers **Walk-in Time**” is to be configured for “**Long Time**” (60s).

If the Rectifiers Long Walk-in-Time is not enough, then you can enable the generator dependent “Rectifiers’ **Start-up Delay**”, for example to **5 minutes**.

The hybrid system must **monitor** and log the **fuel consumption**. The hybrid system’s gen-set is implemented with two **5000 liters diesel tanks**. The supplier’s tank **strapping tables** are available with **10cm increments**. The Fuel Level Transducers have a **level offset** of **5cm**.

Configuration of Generator Functionality

You can use the controller’s keypad or other GUI to configure the controller’s Generator parameters with the specified criteria.

See the “[Configuration Criteria](#)” on page 260.

Also, you find a control logic flowchart illustration in topic “[Generator Control Logic – Flowchart](#)” on page 275.

Follow the configuration steps below.

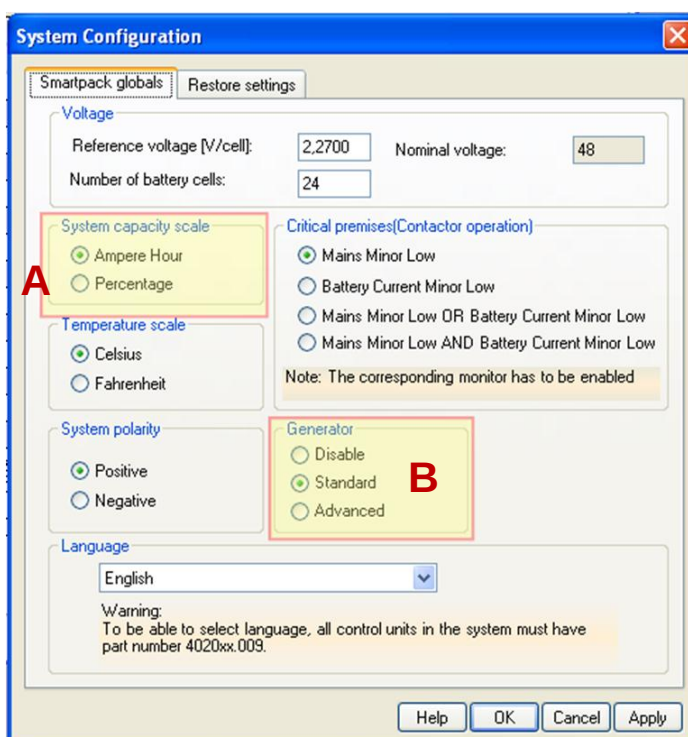
In short:

- Step 1- Enable the Generator function
- Step 2- Define Alarm Output Group and Assign Relays
- Step 3- Link Generator Functions to Output Group
- Step 4- Configure Automatic Generator Start/Stop Criteria
- Step 5- Configure Periodic Generator Start/Stop Criteria
- Step 6- Optionally, disable the Mains voltage alarm
- Step 7- Optionally, configure inputs for gen-set feedback
- Step 8- Optionally, configure rectifiers' start-up delay
- Step 9- Configure the fuel tank

More Detailed:

Step 1 - Enable the Generator Function

Use the controller's keypad or other GUI, and carry out the following to **enable the Generator** Function:



Example dialog box from *PowerSuite* GUI,
on the toolbar, the System Configuration dialog box, the Smartpack Globals

- Select the **Standard** Generator radio button (B)
(the Advance option is not in use)
- Select the **Percentage** system capacity scale (A)
(to show the battery bank capacity in %, instead of in Ah)
- Click on the **Apply** button to activate the changes, then on the **OK** button

Step 2 - Define Alarm Output Group and Assign Relays

Use the controller's keypad or other GUI, and carry out the following to **define** an Alarm **Output Group** and to assign alarm relays to the group.

The controller will use the **alarm output group to start and stop the generator**. We assign 2 relays to the alarm output group, one to start the generator and the other to e.g. switch ON a “generator running” lamp or similar.

NOTICE:

When the power system is fed from 2 gen-sets, one at a time, you must define 2 different “generator start” Alarm Output Groups, one for each generator.

Alarm group	Alarm output 1	Alarm output 2	Alarm output 3	Alarm output 4	Alarm output 5	Alarm output 6	Counter
Major alarm	☒	☒	☐	☐	☐	☐	0
Minor alarm	☒	☐	☒	☐	☐	☐	0
Mains alarm	☒	☐	☐	☒	☐	☐	0
Fuse alarm	☒	☐	☐	☐	☐	☐	0
Battery high	☒	☐	☐	☐	☐	☐	0
Battery low	☒	☐	☐	☐	☐	☐	0
Rectifier alarm	☒	☐	☐	☐	☐	☐	4
Gen-set Start A	☐	☐	☐	☐	☒	☒ B	0
Alarm Group 09	☐	☐	☐	☐	☐	☐	0
Alarm Group 10	☐	☐	☐	☐	☐	☐	0
Alarm Group 11	☐	☐	☐	☐	☐	☐	0
Alarm Group 12	☐	☐	☐	☐	☐	☐	0
Alarm Group 13	☐	☐	☐	☐	☐	☐	0
Alarm Group 14	☐	☐	☐	☐	☐	☐	0
Alarm Group 15	☐	☐	☐	☐	☐	☐	0
Alarm Group 16	☐	☐	☐	☐	☐	☐	0
Alarm Group 17	☐	☐	☐	☐	☐	☐	0
OutpBlocked	☐	☐	☐	☐	☐	☐	0
LVBD	☐	☐	☐	☐	☐	☐	0
LVLD1	☐	☐	☐	☐	☐	☐	0

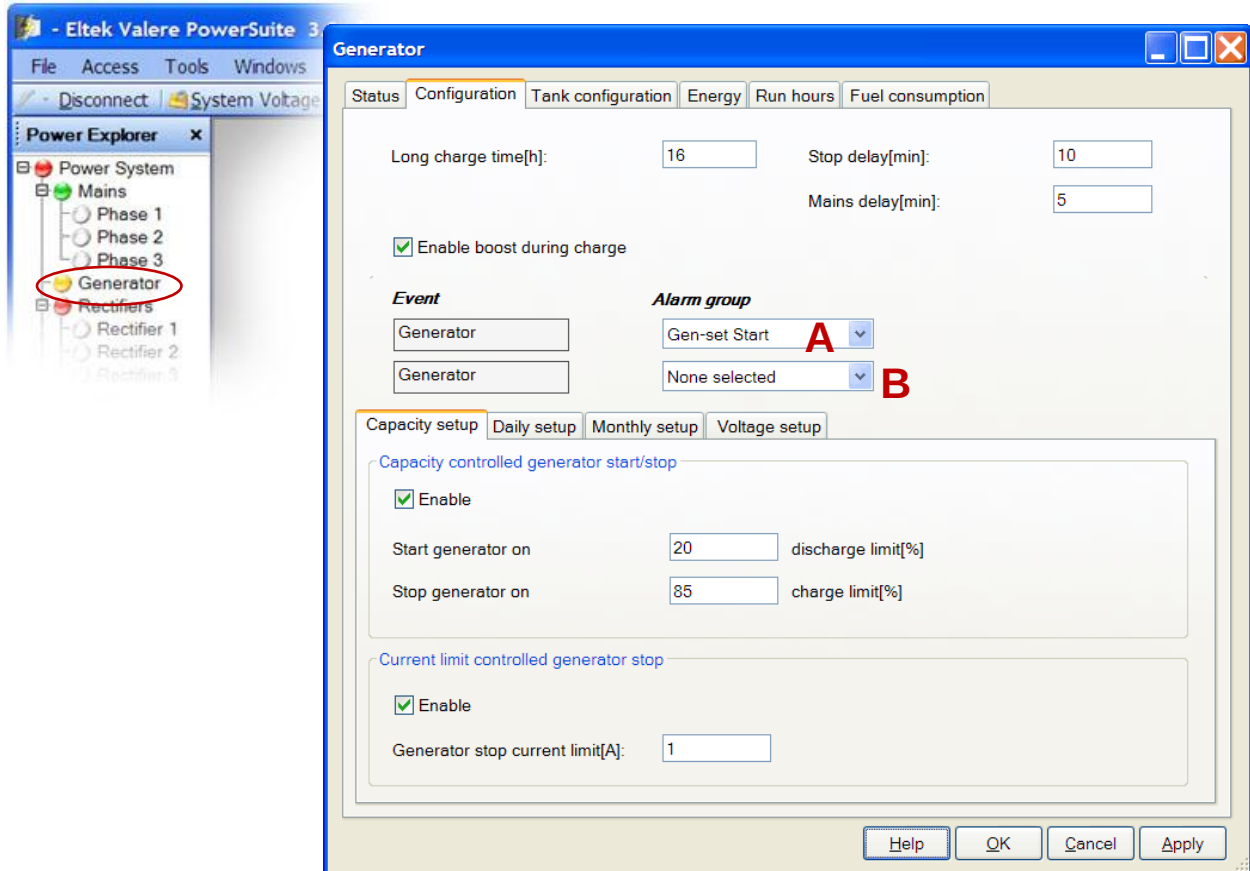
Example dialog box from *PowerSuite* GUI,
on the toolbar, the Alarms Overview dialog box, the Outputs tab

- **Rename** the spare Alarm Output Group “Alarm Group 08” to e.g. “Gen-set Start” (A)
- **Assign the relays** “Alarm Output 5” and “Alarm Output 6” to the group “Gen-set Start”; checked boxes (B).
Relay 5 will start the generator, and **relay 6** will turn **ON an external lamp** to indicate when the gen-set is running.
- Click on the **Apply** button to activate the changes, then on the **OK** button

For detailed information, refer to topic “[Alarm Output Groups](#)” on page 328, and to the tutorial “[How to Configure Alarm Output Groups](#)” on page 367

Step 3- Link Generator Functions to Output Group

Use the controller's keypad or other GUI, and carry out the following to “connect” the configured **alarm output group** to the **Generator** function.



Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Generator dialog box, the Configuration tab, the Capacity Setup sub tab

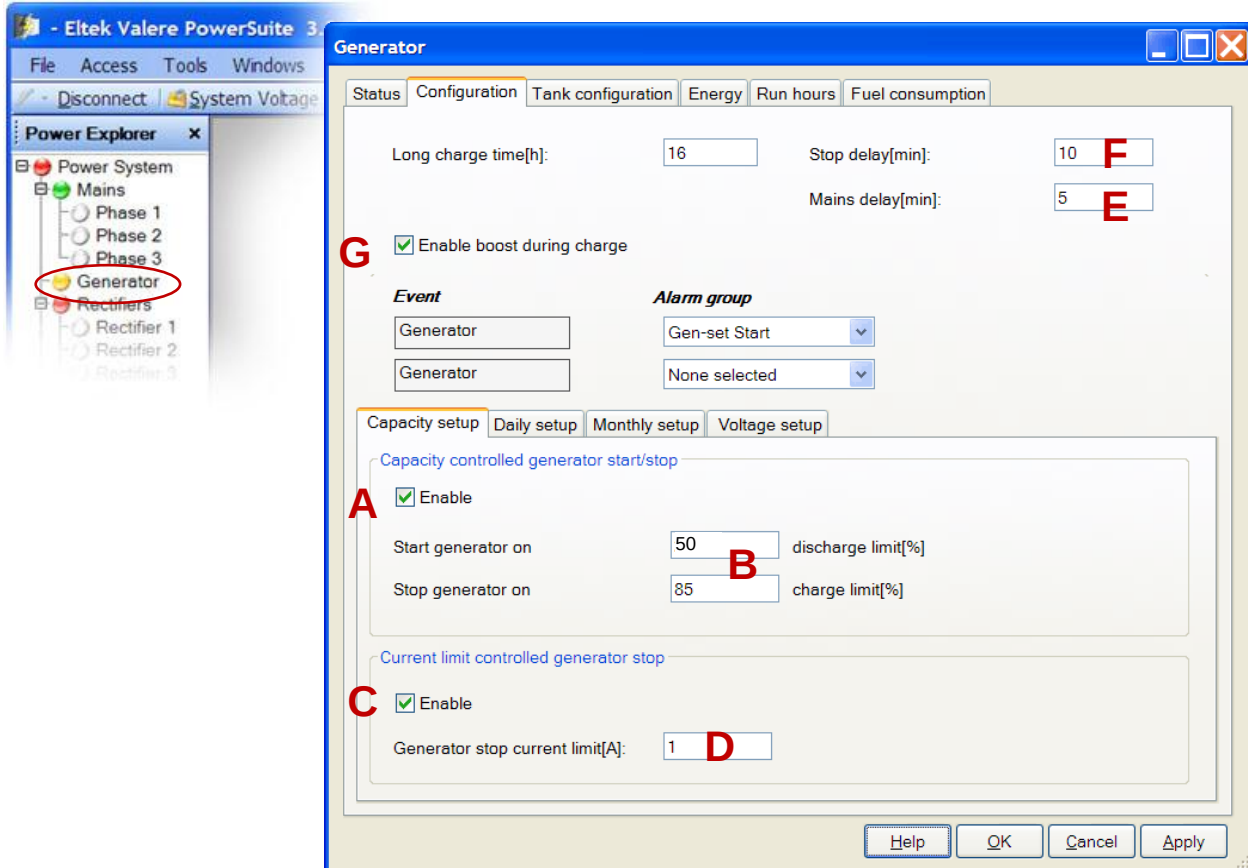
- **Open the Generator** dialog box
by double clicking on Generator icon, on *PowerSuite*'s power explorer pane
- Select the previously defined alarm output group “**Gen-set Start**” to the first **Generator event** (A),
thus “connecting” the alarm output group to the Generator function.
Notice that you could use another alarm output group (B) to start another generator (in double-generator fed systems)
- Click on the **Apply** button to activate the changes

NOTICE:

When the power system is fed from 2 gen-sets, one at a time, you must define 2 different “generator start” Alarm Output Groups, one for each generator, e.g. “Gen-set Start” and “Gen-set Start2”.
You could then select “Gen-set Start2” (B) to start the second gen-set.

Step 4- Configure Automatic Generator Start & Stop Criteria

Use the controller's keypad or other GUI, and carry out the following to **configure the automatic** Generator start & stop **criteria** (AC Mains, Battery Discharge Level, Battery Charging Current and Battery Voltage criteria).



Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Generator dialog box, the Configuration tab, the Capacity Setup sub tab

AC Mains Criteria

- Type <5> in the “**Mains Delay [min]**” field (E); the delay will prevent starting the generator during short mains outages
- Type <10> minutes in the “**Stop Delay [min]**” field (F); to charge the batteries a bit longer

You can optionally disable the system's Mains alarm, as explained in topic “[Step 6- Optionally, disable the Mains voltage alarm](#)” on page 270.

Battery Discharge Level Criteria

- Check the “**Enable**” box (A) to activate the “**Capacity controlled** generator start/stop” criteria
- Type in the start and stop generator fields (B) the battery **discharge level** (50% DOD) to start the generator, and the **charged level** (85% SOC) to stop the generator

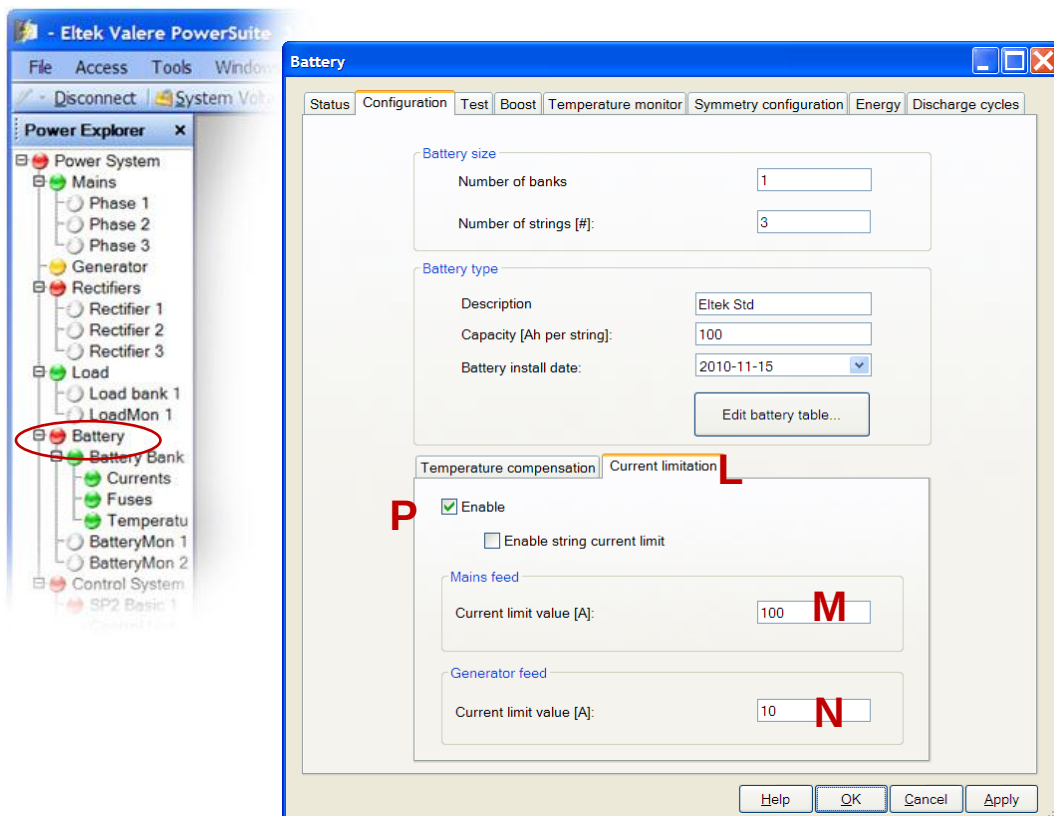
Battery Charging Current Stop Criteria

- Check the “**Enable**” box (C) to activate the “**Current limit controlled** generator stop” criteria

- Type <1> amp in the “**Generator stop current limit [A]**” field (D); stops the generator when the charging current reaches this limit
- Check the “**Enable boost during charging**” box (G) to allow e.g. automatic battery boost charging (reduces recharging time). Refer to topic “[Battery Boost Charging](#)” on page 315, for configuration of boost charging method, parameters, etc.
- Click on the **Apply** button to activate the changes, then on the **OK** button

Battery Charging Max. Current Criteria

In addition to configuring the 1A “Generator stop current limit”, carry out the following to **configure** the 10A max “**generator-feed battery charging current limit**”.



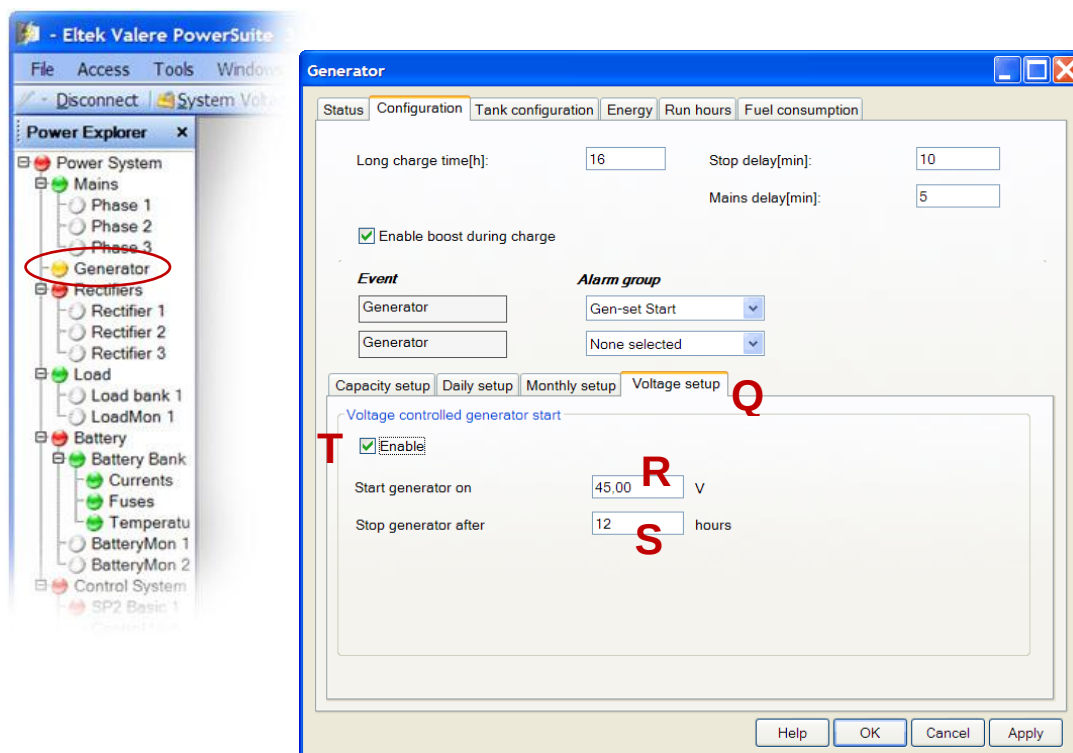
Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Battery dialog box, the Configuration tab, the Current Limitation sub tab

- Open the **Battery dialog box**, click in the **Configuration tab**, then in the **Current Limitation sub tab** (L)
- Check the “**Enable**” box (P) to enable the “**generator-feed battery charging current**” criteria
- Type e.g. <100> amp in the Mains Feed “Current limit value [A]” field (M), and <10> amp in the **Generator Feed “Current limit value [A]”** field (N)
- Click on the **Apply** button to activate the changes, then on the **OK** button

Read more about “[Battery Charging Current Limitation](#)” on page 317, and also about “[Excessive Battery Charging and Discharging](#)” on page 318.

Battery Voltage Criteria

In addition to the battery discharge level criteria, carry out the following to **configure the battery “Voltage controlled generator start” limit.**

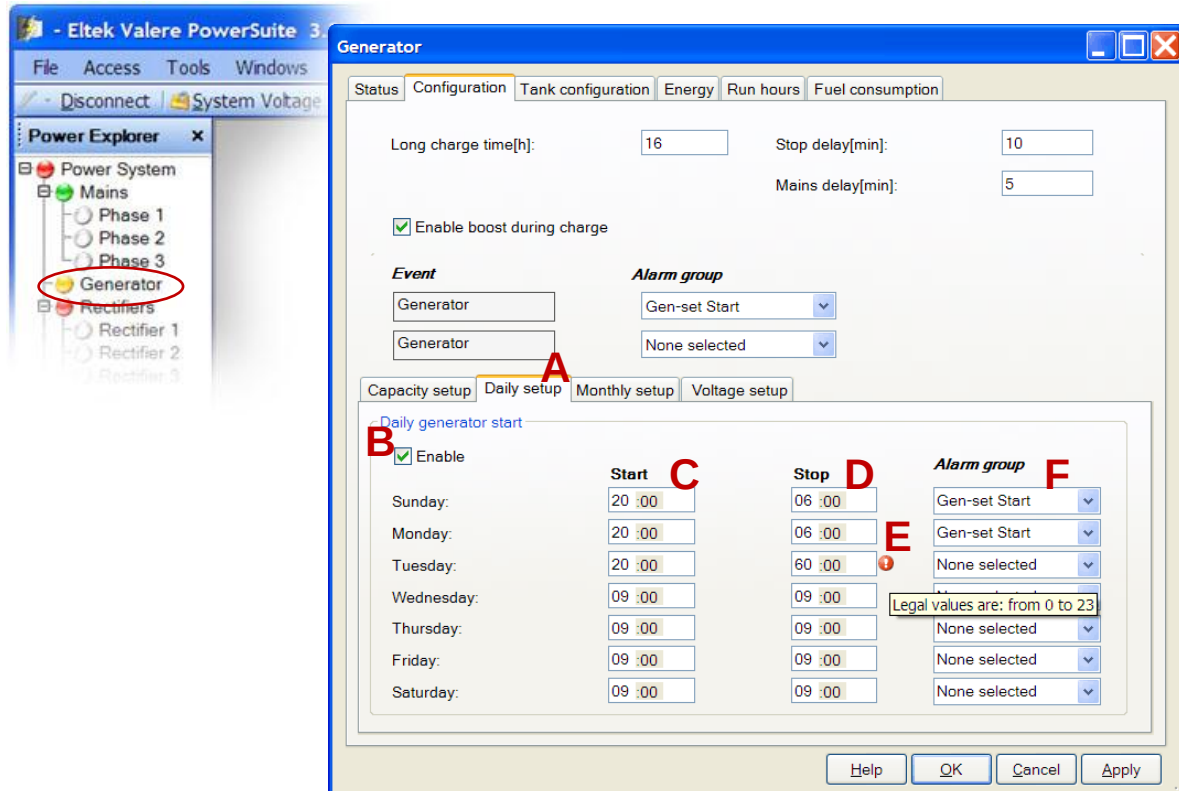


Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Generator dialog box, the Configuration tab, the Voltage Setup sub tab

- **Open the Generator** dialog box
by double clicking on Generator icon, on *PowerSuite*'s power explorer pane
- Check the “**Enable**” box (T) to activate the “**Voltage controlled** generator start/stop” criteria
- Type in “**45**” in the “**Start generator on**” field (R), and type in “**12**” in the “**Stop generator on**” field (S),
to start the generator if the battery voltage is 45V or lower, and stop it 12 hours afterwards
- Click on the **Apply** button to activate the changes

Step 5- Configure Periodic Generator Start & Stop Criteria

Use the controller’s keypad or other GUI, and carry out the following to configure the **periodic daily and monthly** Generator start & stop criteria.



Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Generator dialog box, the Configuration tab, the Daily Setup sub tab

Periodic Daily Criteria

- Click in the “**Daily Setup**” sub tab (A), and check the “**Enable**” box (B) in the daily generator start section to activate the periodic generator start/stop criteria
- Type <20:00> hours in **all the Start** fields (C), and <06:00> hours in **all the Stop** fields (D) to start the generator every day during the night at 20:00 hours and stop it at 06:00 hours.
Notice how the typo 60:00 (E) generates an error balloon, as valid entries are between 0 and 23 hours. Minutes are not editable.
- Select the predefined alarm output group “**Gen-set Start**” (F) for **all weekdays**. Each selected alarm output group will start the generator the respective weekday.
- Click on the **Apply** button to activate the changes

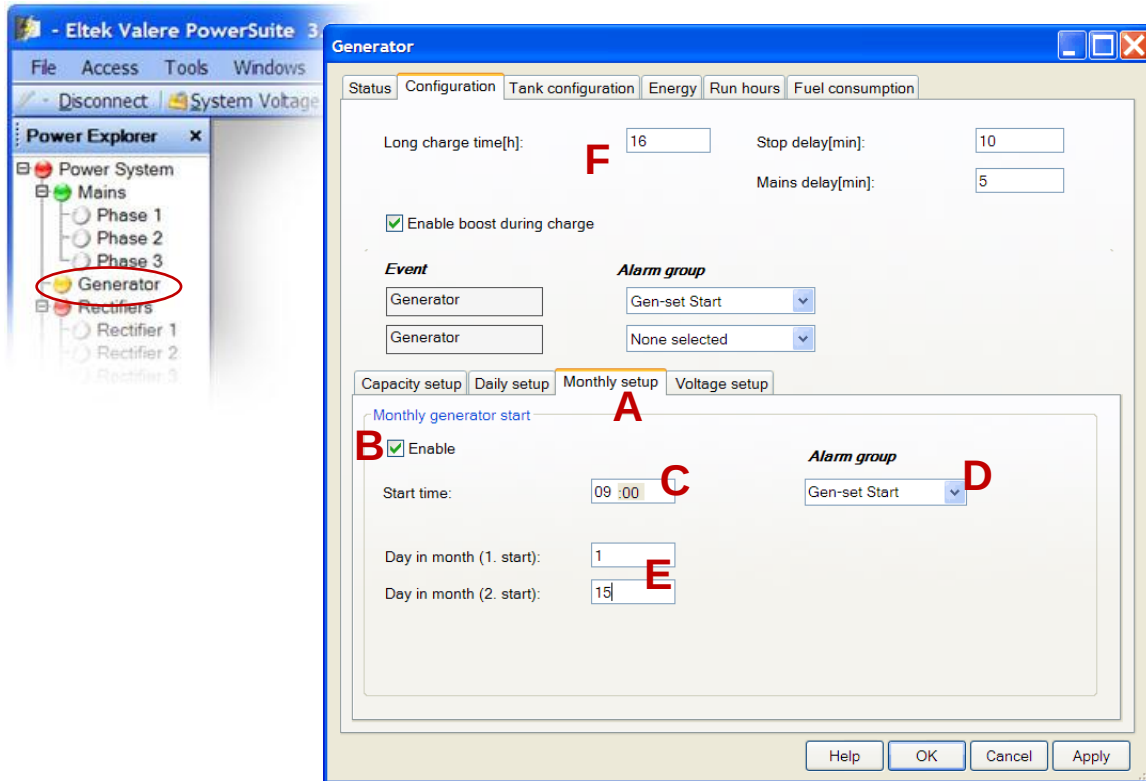
NOTICE:

When the power system is fed from 2 gen-sets, one at a time, you must define 2 different “generator start” Alarm Output Groups, one for each generator, e.g. “Gen-set Start” and “Gen-set Start2”.

You could then select which generator to start every weekday. E.g. selecting “Gen-set Start2” to start the second gen-set on Tuesdays, Wednesdays and Thursdays; and selecting “Gen-set Start” the rest of the weekdays.

Periodic Monthly Criteria

In addition to the periodic daily criteria, carry out the following to configure the **periodic monthly** Generator start & stop criteria.



Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Generator dialog box, the Configuration tab, the Monthly Setup sub tab

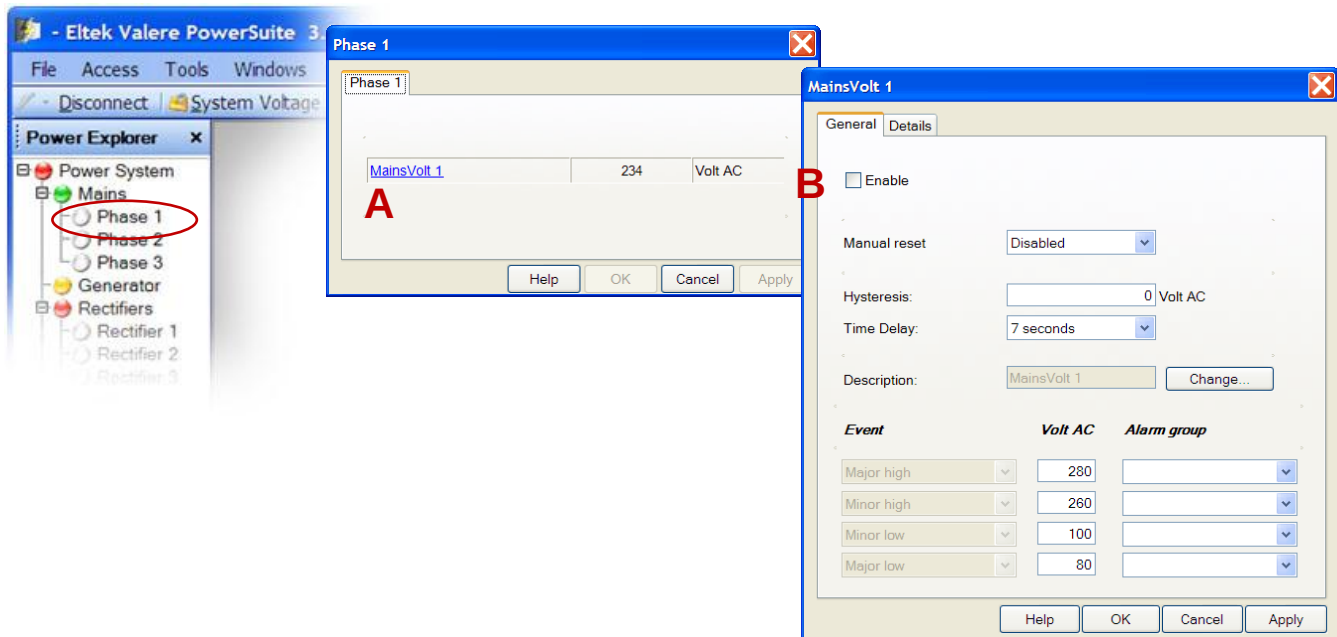
- Click in the “**Monthly Setup**” sub tab (A), and check the “**Enable monthly generator start**” box (B) to activate the periodic generator start/stop criteria
- Type <09:00> hours in the **Start** field (C) for the monthly start of the generator at 09:00 hours
- Select the predefined alarm output group “**Gen-set Start**” (D). The selected alarm output group will start the generator at the configured time, at 09:00
- Type <1> in the “**Day in month (1st start)**” field, and type <15> in the “**Day in month (2nd start)**” field (E) for the monthly start of the generator the 1st and the 15th of every month
- Type <16> hours in the “**Long charge time [h]**” field (F) so that the generator, starting at 09:00 hours, may run for 16 hours, the 1st and the 15th of every month
- Click on the **Apply** button to activate the changes, then on the **OK** button

Step 6- Optionally, disable the Mains voltage alarm

When the **gen-set is not running** and the hybrid system is supplied from the solar PV panels, the system will detect that the AC Mains input is OFF, and **will generate a Mains alarm**.

Carry out this step, only if you **want to avoid** the system’s **Mains alarm**.

Use the controller's keypad or other GUI, and carry out the following to **disable** the power system's **Mains voltage alarm** monitors on **phase 1, phase 2 or phase 3**.



Example dialog box from *PowerSuite* GUI in the Power Explorer pane, the Phase1 dialog box. Also the dialog box for the alarm monitor “MainsVolt1”

- **Open the Phase1** dialog box by double clicking on Phase1 icon, on *PowerSuite*’s power explorer pane
- Double click on “**MainsVolt1**” alarm monitor (A)
- In the MainsVolt1 dialog box, **uncheck** the “Enable” box, to deactivate the **system’s Mains voltage alarm** (B)
- Click on the **Apply** button to activate the changes, then on the **OK** button

Step 7- Optionally, configure inputs for gen-set feedback

After the system controller has started the gen-set, it will assume that the generator is not running if it detects (via the “GeneratorFail” alarm monitor) that the AC Mains input is OFF.

The alarm monitor outputs a generator alarm, if the controller has started the generator (“Generator activation” is ON) and the mains input is OFF.

But it could be possible that the gen-set is running, but it does not output any supply power, due to e.g. malfunctioning.

Carry out this step, only if you want to implement feedback from the diesel engine via one of the system’s digital inputs, that can be configure to activate external “Running”/“Non-Running” lamps or similar devices. I also can be used to rise an alarm if the controller starts the gen-set, but receives “Non-Running” feedback via the digital input.

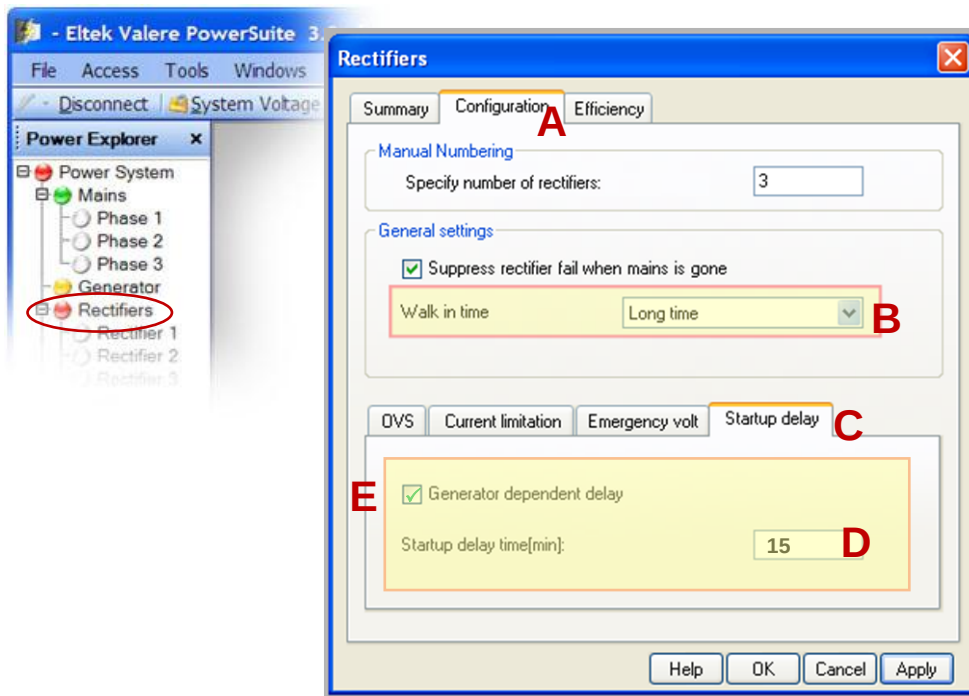
Use the controller’s keypad or other GUI to configure a digital input to get feedback from the generator, and to activate external warning lamps or similar devices.

For detailed information about how to configure it, refer to the tutorial [“How to Configure Alarm Monitors & Programmable Inputs”](#) on page 368.

Step 8- Optionally, configure rectifiers’ start-up delay

Two features – the “Rectifiers **Walk-in Time**” and the generator dependent “Rectifiers’ **Start-up Delay**” – contribute to reduce battery damage, caused by very large in-rush currents at AC connection and reconnections to the system’s Mains input, especially when running on low current supply AC sources (solar panels, AC generators, etc).

Use the controller’s keypad or other GUI to configure the power system’s rectifiers with the features “Walk-in Time” or “Start-up Delay”, when AC mains is reconnected after a mains outage.



Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Rectifiers dialog box, the Configuration tab, the Startup Delay sub tab

Rectifiers’ Walk-in Time

When the power system is supplied from a gen-set, it is **recommended** to have the standard rectifiers’ Walk-in Time feature configured with “**Long Time**”.

Read more about [“Rectifier Walk-in Time”](#) on page 282.

Carry out these steps, **only** if you want to **configure** the rectifiers’ **Walk-in Time** feature:

- **Open the Rectifiers** dialog box
by double clicking on Rectifiers icon, on *PowerSuite*’s power explorer pane; click on the **Configuration** tab (A)
- Select “**Long Time**” (B) in the General Settings section,
to configure the rectifiers’ “Walk-in Time” to 60s (the default “Short Walk-in Time” is 5s)
- Click on the **Apply** button to activate the changes

Rectifiers' Start-up Delay

If the **60s option** in the rectifiers' Walk-in Time feature **is not enough** for the specific gen-set installation, an additional rectifiers' **Start-up Delay feature** may be configured.

Then, when the gen-set AC mains is again reconnected, the configured rectifiers' Walk-in Time function will be delayed with the number of minutes configured in the "Start-up Delay" feature.

In this hybrid system example, we recommend a rectifiers' Start-up Delay of 15 minutes.

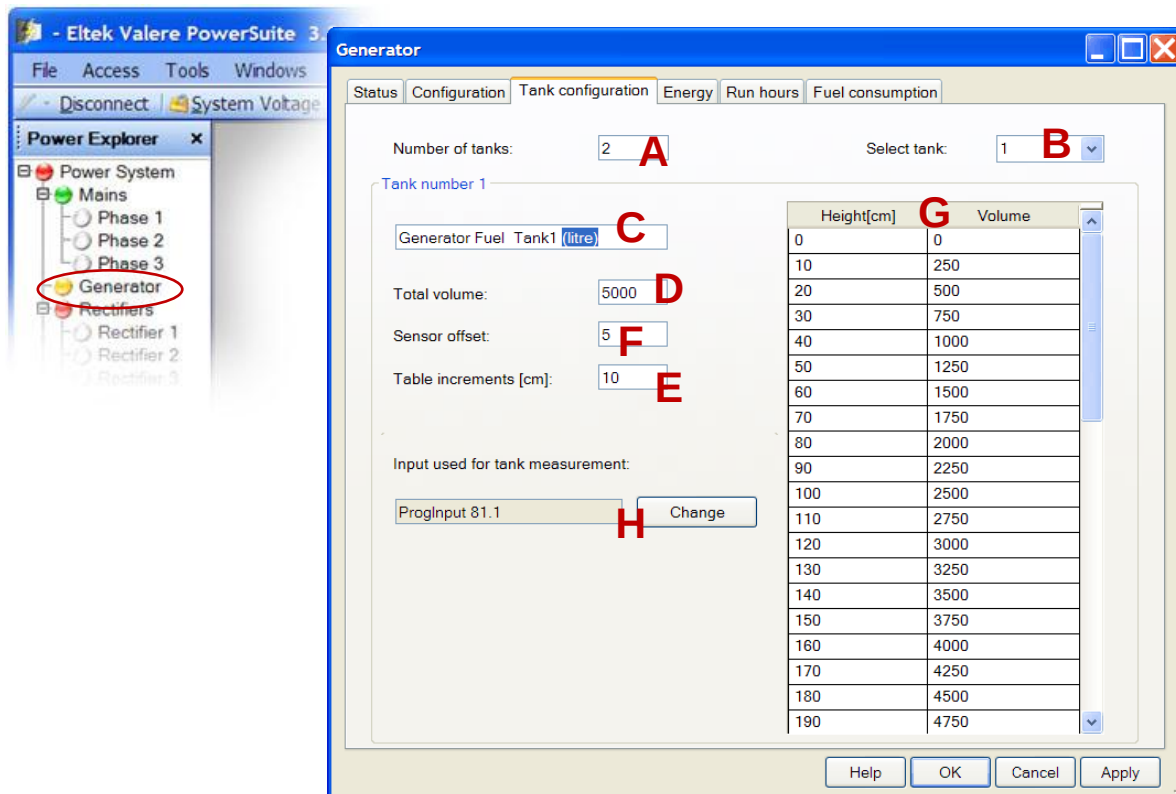
Carry out these steps, **only** if you want to **configure** the rectifiers' **Start-up Delay** feature:

- **Open the Rectifiers** dialog box by double clicking on Rectifiers icon, on *PowerSuite*'s power explorer pane; click on the **Configuration** tab (A) and then on the "**Startup delay**" sub tab (C)
- Type **<15>** minutes in the "**Startup delay time [min]**" field (D)
- Check the "**Generator dependent delay**" box (E) to "connect" the delay to the controller's generator event
- Click on the **Apply** button to activate the changes, then on the **OK** button

Step 9- Configure the fuel tank

As the hybrid system must **monitor** and log the **fuel consumption**, you must enter the tank configuration data and complete the **strapping table**.

Use the controller's keypad or other GUI, and carry out the following to configure the fuel tanks used by the gen-set.



Example dialog box from *PowerSuite* GUI
in the Power Explorer pane, the Generator dialog box, the Tank Configuration tab

- In the Generator dialog box,
click on the “**Tank Configuration**” tab
- Type <2> in the “**Number of tanks**” field (A),
and click on the **Apply** button to register the change
- Type <1> in the “**Select tank**” field (B), to configure the first fuel tank
- Enter a name to **describe the tank** #1; (C)
e.g. <Generator Fuel Tank 1 (litre)>.
It is recommended to **include the used units** in the tank description name, as there is no reference to the units any other place in the dialog box.
Regarding units, refer to the notice below
- Type <5000> in the “**Total Volume**” field (D), to indicate the total tanks volume.
Regarding units, refer to the notice below
- Type <10> cm in the “**Table increments [cm]**” field (E);
Read below about strapping tables
- Type <5> cm in the “**Sensor Offset**” field (F);
and click on the **Apply** button to register the changes.
Read below about sensor offset
- For each of the **strapping table** rows (G), enter the **corresponding volume**. e.g. for 50cm height, enter <1250>
Regarding units, refer to the notice below.
Also, read below about strapping tables.

NOTE:

The volume values displayed in the dialog box are just default entries in this example.

- Click in the “**Change**” button, (H)
and in the displayed “Input Configuration” section,
select the I/O Monitor3 CAN Node and its corresponding digital input,
used to monitor the Fuel Level Transducer.
E.g. Select “**I/O unit 1**” in the “Select Unit” field,
and “**Outdoor Temp 81.1**” in the “Select Input” field.
Read below about “Level Sensor and Digital Input”

Click then on the **Apply** button, right under the “Select Input” field

- Click on the **Apply** button to activate the changes

NOTICE:

The volume data may be entered in liters, gallons or any other suitable volume unit. It is recommended to include the used units in the tank description name, as there is no reference to the units any other place in the dialog box.

Level Sensor and Digital Input

The Fuel Level Transducers may be monitored with “Config. **Input 5**” or “Config. **Input 6**” in the **I/O Monitor3 CAN Bus Node (T3)**, as these inputs are designed for accurate, analogue current measurements.

The I/O Monitor3 CAN Bus Node (T3) is specially developed for solar hybrid power systems, and is equipped with inputs for increased precision of analogue measurements, intended to be used for fuel tank management, solar irradiation, wind measurements, etc.

Sensor Offset

The Fuel Level Transducers have a level offset of **5cm**. The **sensor offset**, or mounting level offset, is used to offset the level output of the sensor to match the actual level of the tank. The offset compensates for the unmeasured length at the bottom of the sensor, due to the float or agitators near the bottom of the tank.

Strapping Table

The **Strapping Table** is used to map sensor measurements (height in cm) to tank volume. The strapping table is implemented with 2 columns (height and volume) and 21 rows of data. The height starts at 0 and is automatically incremented with the entered **table increments** of **10cm**.

The **volume data** entered at each table row is **usually provided by the tank manufacturer's** capacity tables or strapping tables.

NOTICE:

Using the table in the dialog box, **you can create your own strapping table** to describe any suitable tank, regardless of its physical size or geometry (tank calibration or tank strapping).

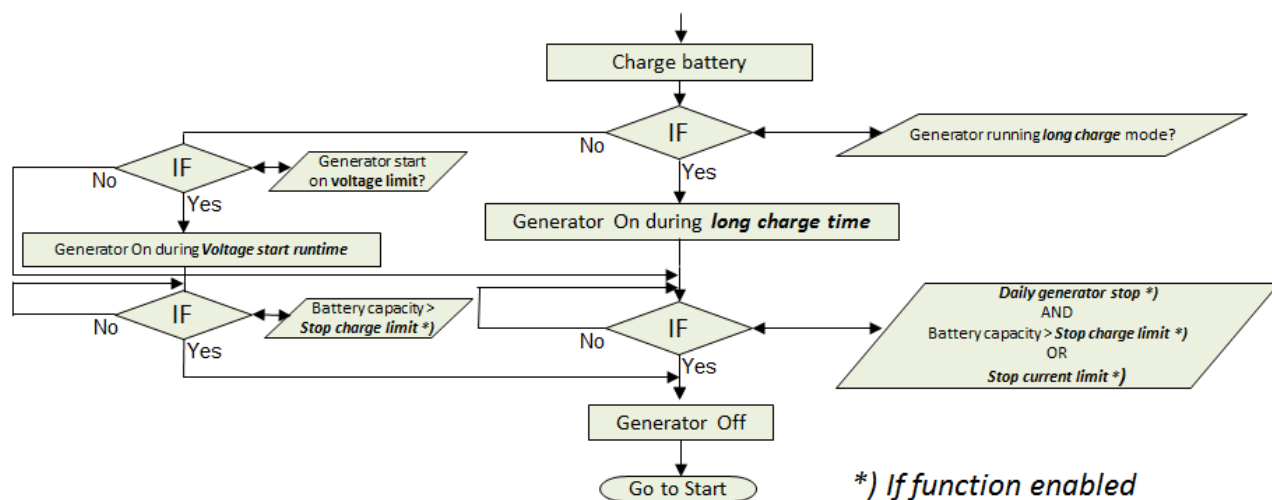
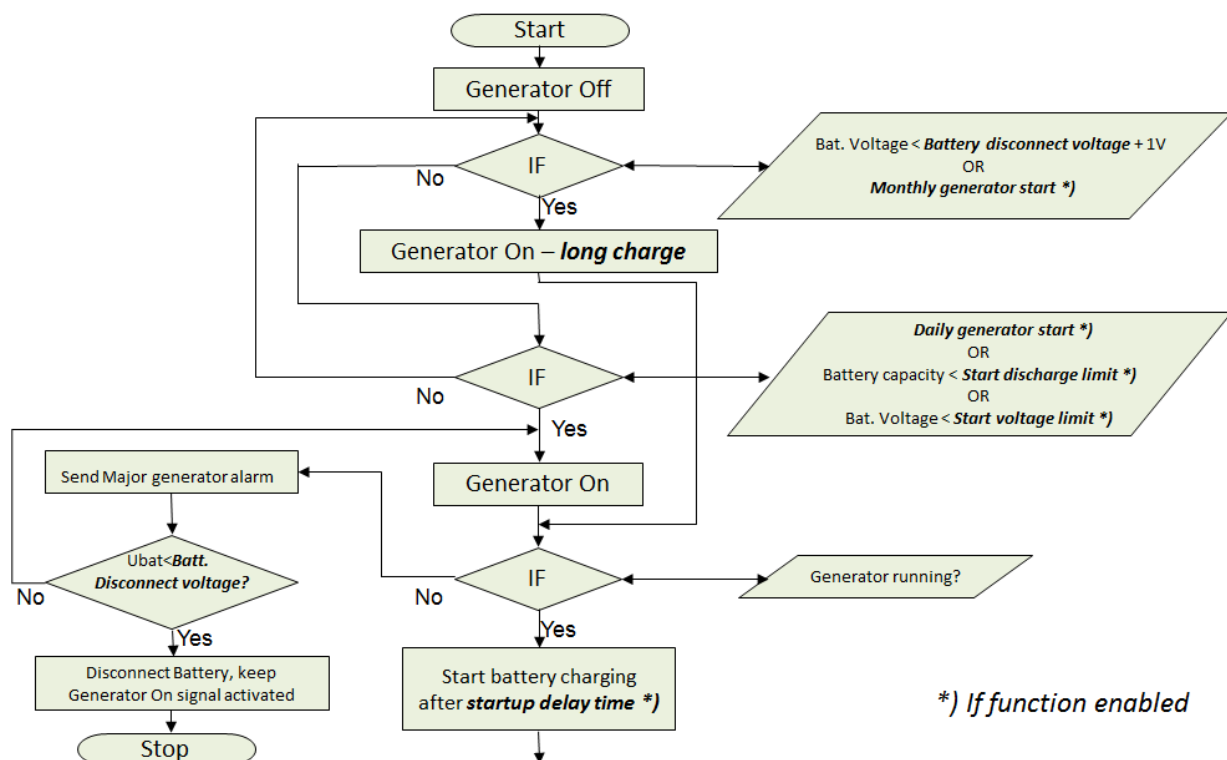
To do that:

- Start filling the tank with e.g. 50 liters or gallons of fuel, and perform a level measurement using the level sensor
- Fill another 50 liters of fuel, and carry out a second level measurement
- ...continue filling the tank with 50 liters fuel at a time, and executing level measurements, until the tank is full
- Enter the registered data in the strapping table

For information about the Energy tab, the Run Hours tab and the Fuel Consumption tab, read topics "[Energy Log](#)" on page 235, "[Generator Run Hours Log](#)" on page 238 and "[Generator Fuel Consumption Log](#)" on page 239. Or the "[Generator dialog box](#) (page 75)" topic in *PowerSuite Help*.

Generator Control Logic – Flowchart

The flowchart below shows the generator control logic, and may help illustrating the configuration of the generator.



Fixed additional start/stop criteria:

- The battery current must be negative, to allow the generator to start
- The battery current must be positive, to allow the generator to stop

Configurable Parametere	Default Value
Battery disconnect voltage	43,2V
Monthly generator start	1st day of month 10:00
Long charge time	12h
Daily generator start	disabled
Daily generator stop	disabled

Start discharge limit	50% DOD
Stop charge limit	85% SOC
Stop current limit	disabled
Startup delay time	0 min
Gen. feed current limit value	0A
Start voltage limit	48 V
Voltage start runtime	12h

Controller Software version:

- SP1 SW. 3.06
- SP2 SW. 1.1

Rectifier Functions

This section clarifies functionality related to the DC power system's rectifiers.

Plug-and-Play Rectifiers

WARNING:

It is important to insert the Flatpack2 rectifiers in the correct position in the power shelves.

This fact is not so important in systems using Micropack rectifiers.

When a rectifier is **hot plugged in a power shelf for the first time**, the main controller assigns the next available ID number to the rectifier, starting with "01". This ID number (or CAN bus address) and the rectifier's serial number are stored in both modules.

When a **previously installed (hot plugged)** rectifier is inserted in a power shelf, the main controller "recognises" the module, and assigns the same ID to the rectifier.

In other words, the controller and the rectifier "remember" the assigned ID and serial numbers, even after removing and reinserting the rectifier in the shelf.

To achieve a more controlled ID assignment, you should always insert & hot-plug **new rectifiers** in the power shelves, **one module at a time, starting with shelf position 1, 2, 3 and so on**. The sequence is indifferent after positions 9.

The power shelf position numbers vary with the type of AC mains and the type of power shelves installed in your system. Refer to your system's quick start guide and specific documentation for more information.

Do not relocate already pre-installed rectifiers.

Resetting the Number of Rectifiers

When a rectifier reset is activated, the number of rectifiers is recalculated, and only the number of communicating modules at the moment will be counted.

For instance: in a DC power system equipped with 10 rectifiers, rectifier with ID number "04" malfunctions. If you insert rectifier ID#10 in the position of the failing ID#04, and then activate a rectifier reset, the controller recalculates the number of communicating rectifiers to only 9. At the same time the controller reassigns rectifier with ID#10 to ID#04, thus filling the gap.

Rectifier Information

You can display information about the rectifiers,

In *Compack*-based systems, via:

- The *WebPower* configuration web pages
- The *PowerSuite* application

In *Smartpack*- and *Smartpack2*-based systems, via:

- The *WebPower* configuration web pages
- The *PowerSuite* application
- The controller's front keys

From the Smartpack2 Master Controller's Front

Refer to topics "[System Status options](#)" on page 182, and "[System Configuration options](#)" on page 185.

From the Smartpack Controller's Front

You can display information about the *Flatpack2* rectifiers communicating in the system, by selecting "**UserOption > Rectifier Info**", via the *Smartpack* controller's front keys.

Following information may be displayed selecting the *Rectifier Info* sub options (level 3):

<i>Option</i>	<i>Description</i>
<i>NoOfRects.</i>	Number of rectifiers installed in the system.
<i>RectCurrent</i>	Rectifier current
<i>RectSerialNumber</i>	Rectifier ID and serial number
<i>Rect.PrimaryVolt</i>	Rectifier input voltage
<i>Rectifier Status</i>	Rectifier status
<i>Rectifier Temp</i>	Rectifier temperature

While the controller is accessing information from a specific rectifier, the green LED on the rectifier's front panel flashes.

The *Smartpack* controller sends out status messages every 200ms to all the *Flatpack2* rectifiers connected to the CAN bus, such as:

- The *Smartpack* controller's status
- Current Limit Reference
- Measured Output Voltage
- Reference Output Voltage
- Over-voltage Protection Reference

From PowerSuite

By double-clicking on any of the Rectifier icons, on the *PowerSuite* Power Explorer pane, you can also display important parameters about all the rectifiers in the system, such as:

- Rectifier's ID number
- Rectifier's Status
- Rectifier's Serial Number
- Rectifier's Output Current
- Rectifier's internal ambient temperature
- Rectifier's AC input voltage

Read also the “[Rectifier Details tab](#) (page 93)” topic in *PowerSuite Help*.

From Configuration Web Pages

By clicking on the “**Rectifiers**” link, on the Power Explorer pane, in the *configuration web pages*, you can also display a summary of all rectifiers in the power system, as well as detailed information about each rectifier.

For more information, refer to *WebPower Online Help*.

Rectifier LED Status - Alarm Levels

When the rectifiers are in normal state, the green LED on the module’s front is lit, or flashing if the controller reads data from the rectifier.

Following system events causes the rectifier to switch over to alarm state:

<i>Alarm Type</i>	<i>Caused by System Event</i>
Major Alarm (Red LED is ON)	• Rectifier is in Shut-down Mode due to low mains, or high internal temperature, or high output voltage • Internal rectifier failure (malfunction) • Fan failure (single or double fan malfunction) ** • Low output voltage • CAN bus failure
Minor Warning (Yellow LED is ON)	• Rectifier is in Derating Mode (reduced output power) due to high internal temperature, or low input voltage, or fan failure ** • The remote Battery Current Limit is activated • AC input voltage is out of range • Rectifier in stand-alone mode (or loss of communication with the controller)
Minor Warning (Yellow LED is flashing)	• Rectifier is in Over-voltage Protection Mode (AC input)

** Not applicable with Micropack rectifiers.

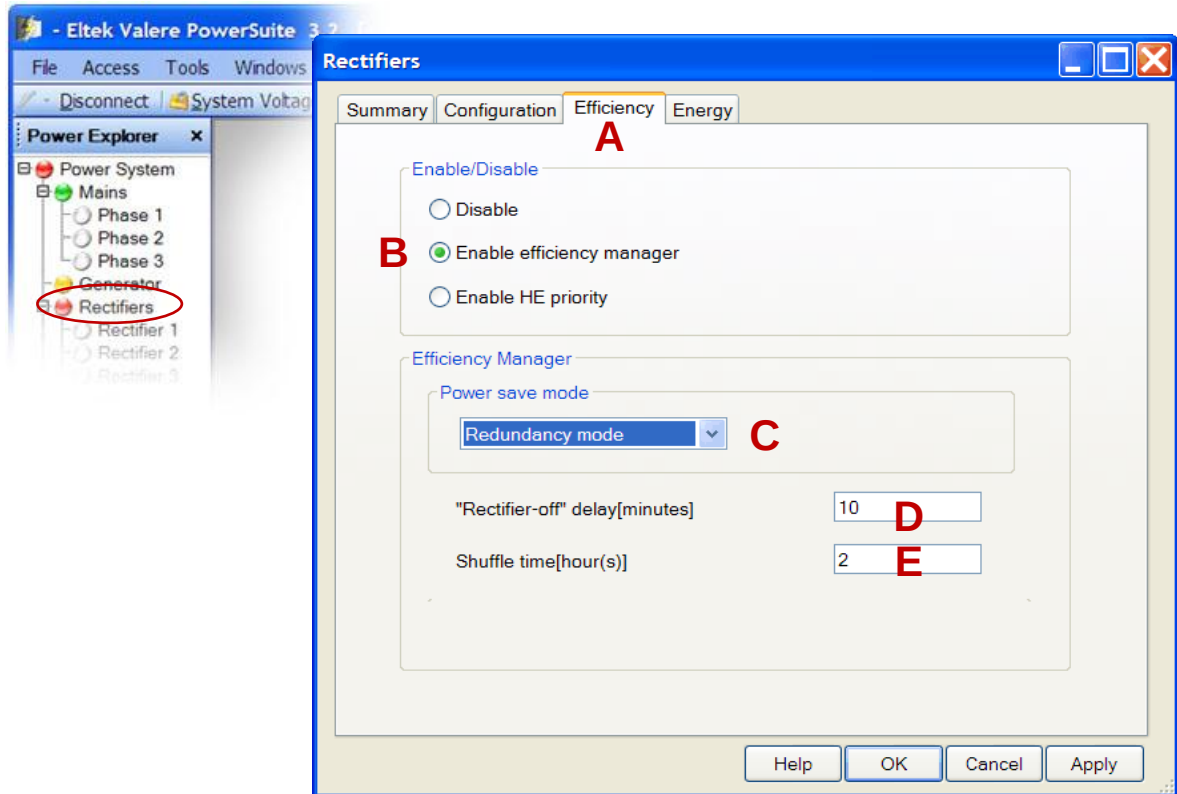
Read also the “[Rectifier Details tab](#) (page 93)” topic in *PowerSuite Help*.

Efficiency Management

This feature optimizes the power system’s efficiency loss, when the load current is less than approx. 50% of the installed rectifier capacity.

The control system’s Efficiency Management is an advanced and very valuable software function that enables reducing the energy cost by **automatically switching OFF unnecessary rectifiers**, so that the remaining running rectifiers

can operate in the most efficient zone of the output efficiency characteristic (typically between 50 to 80% max output on *Flatpack2* rectifiers).



Example of Efficiency Management configuration in *PowerSuite*.

NOTICE:

The “Efficiency Manager” section is **only displayed** when the “Enable efficiency manager” box is checked.
Also, when the “Enable HE priority” box is checked, there is no need for configuring the parameters in the “Efficiency Manager” section.

Enabling

You can use the controller’s keypad or other GUI to configure the Efficiency Management function.

When you enable Efficiency Management, the control system will check if the **total load current is less than approx. 50% of the system’s total capacity**, in which case it will switch OFF redundant rectifiers. Thus, the AC current requirement is reduced and the remaining running rectifiers operate more efficiently.

If the load increases, the control system will automatically switch ON more rectifiers to supply the new load requirements.

Shuffle Time

The Efficiency Management’s **Shuffle Rectifier feature** will further help reduce rectifier fatigue, by **sequentially rotating which rectifiers are switched ON**. The interval of rotation can be adjusted with the Shuffle Time parameter (hours).

OFF Time

During the rotation cycle, one rectifier turns ON and -- **after an interval period** -- **the longest running rectifier will be turned OFF**. The interval period can be adjusted with the OFF Time parameter.

Redundancy

When Efficiency Management is enabled, you can select to operate in “**Redundant Mode**” or in “**Non-Redundant Mode**”.

Operating in Redundant Mode, the control system will **have one more rectifier turned ON** than what it calculates it is ideal.

HE Priority

If the power system has a **mixture of Flatpack2 rectifiers and Flatpack2 HE rectifiers** installed (High Efficiency rectifiers with 96% efficiency), then you can enable the HE Priority feature.

When the HE Priority is activated -- if the HE rectifiers alone can supply 70% or more of the total load current -- then the HE Priority feature **will turn OFF the non-HE rectifiers**, to supply the load more efficiently with only the HE rectifiers.

When the HE Priority is activated, it is not required to select parameters for Shuffle Time, OFF Time and Redundancy.

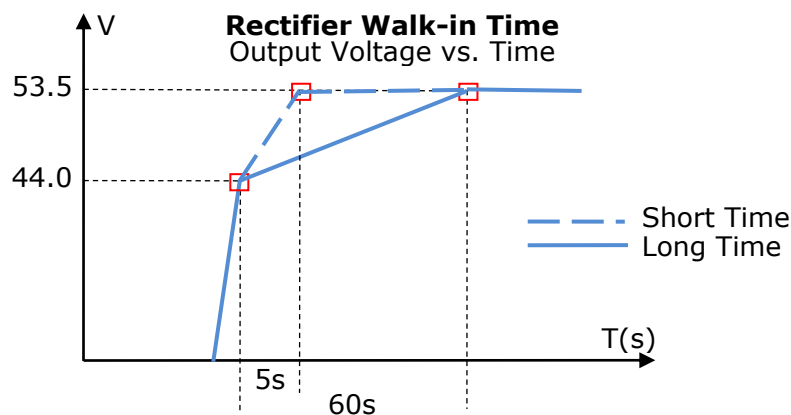
Rectifier Walk-in Time

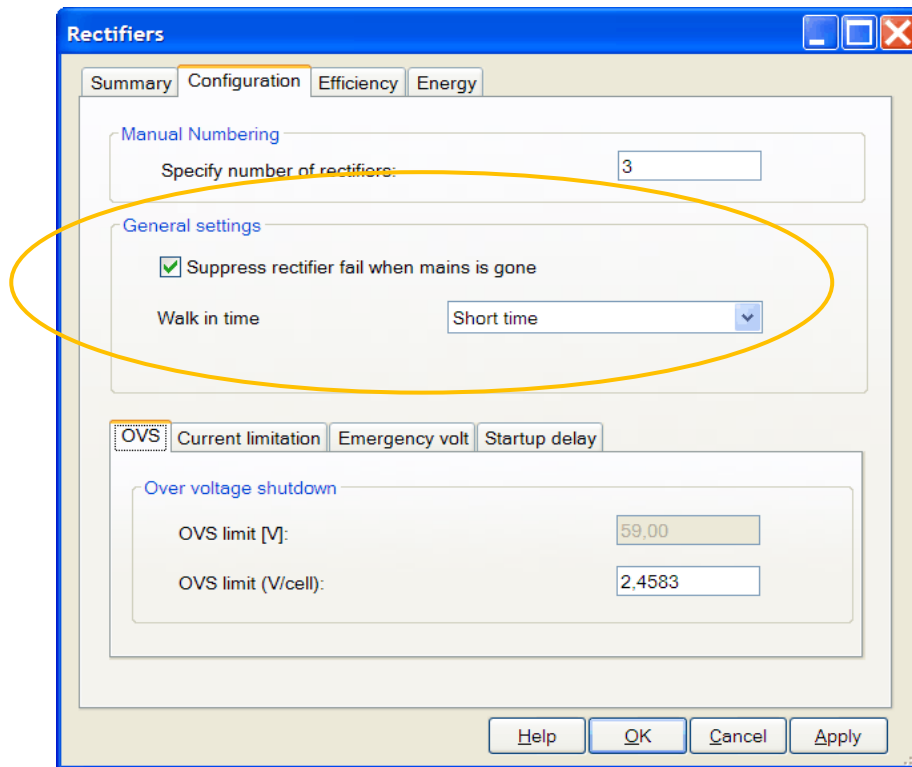
The rectifier’s Walk-in Time is a software function that helps **extend the time** it takes the rectifiers to increase **from the switch-on voltage** (approx 44VDC in a 48V system) **to the specified system float voltage** (default 53.5VDC).

Using the controller’s keypad or other GUI, you can select how long time it will take to reach the default output voltage, by selecting “**Short Walk-in Time**” (5s) which is default or “**Long Walk-in Time**” (60s).

The rectifier’s Walk-in Time feature helps reduce the current pull when running on low current supply AC sources (solar panels, AC generators, etc).

This feature helps also reduce battery damage, caused by very large in-rush currents at AC connection and reconnections to Mains. This is especially critical if the batteries have reached the battery disconnect point or worse, have been deep-discharged.





Example of Rectifier Walk-in time configuration in *PowerSuite*.

Read more in the hybrid site example in topic “[Step 8- Optionally, configure rectifiers’ start-up delay](#)” on page 272.

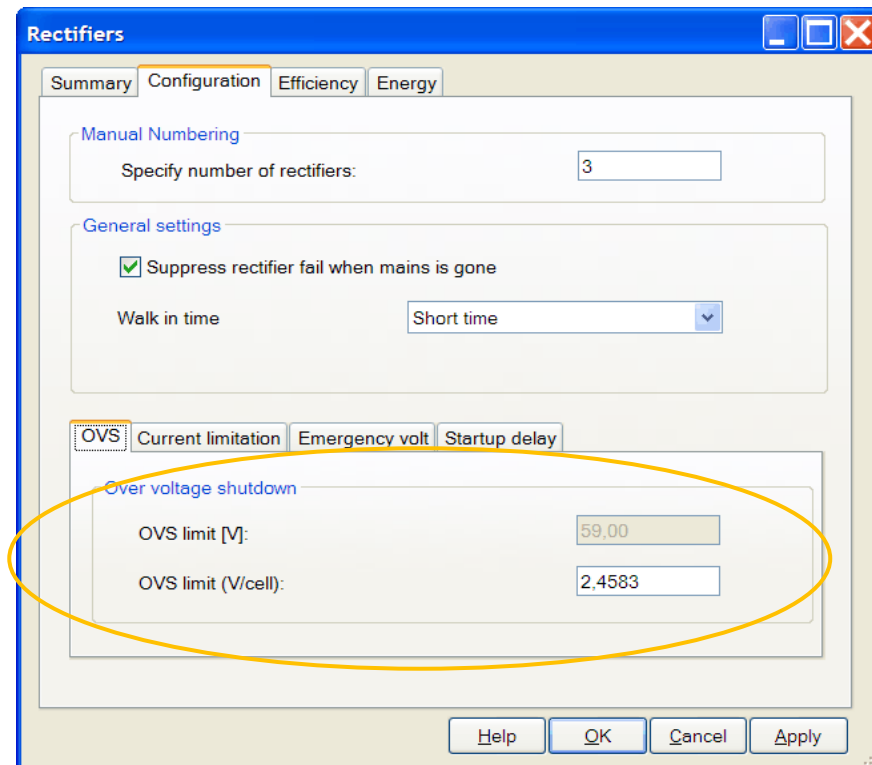
Rectifier OVS Trip Voltage

The system controller uses the Rectifier OVS Trip Voltage or limit (Over Voltage Shutdown) **to protect the load** against e.g. malfunctioning rectifier hardware.

The controller “commands” the rectifiers, via the CAN bus, to **switch OFF, if its output voltage reaches the OVS limit**, which is always higher than the default output voltage (53.5VDC in 48V systems).

Typical OVS trip voltages are: 74.38VDC for 60V rectifiers, 59.50VDC for 48V rectifiers and 29.75VDC for 24V rectifiers.

Using the controller’s keypad or other GUI, you can set the OVS Trip Voltage to a suitable value above the default output voltage.



Example of Rectifier OVS Trip Voltage configuration in *PowerSuite*.

The Rectifier OVS Trip Voltage is calculated as the **product of the battery cell voltage and the number of battery cells** in the power system. E.g. enter “2.4583” battery cell voltage to configure a OVS Trip Voltage of 59.00V (59V divided by 24 battery cells in a 48V system equals 2.4583).

Read more in topic “[Battery Banks, Strings and Blocks](#)” on page 294.

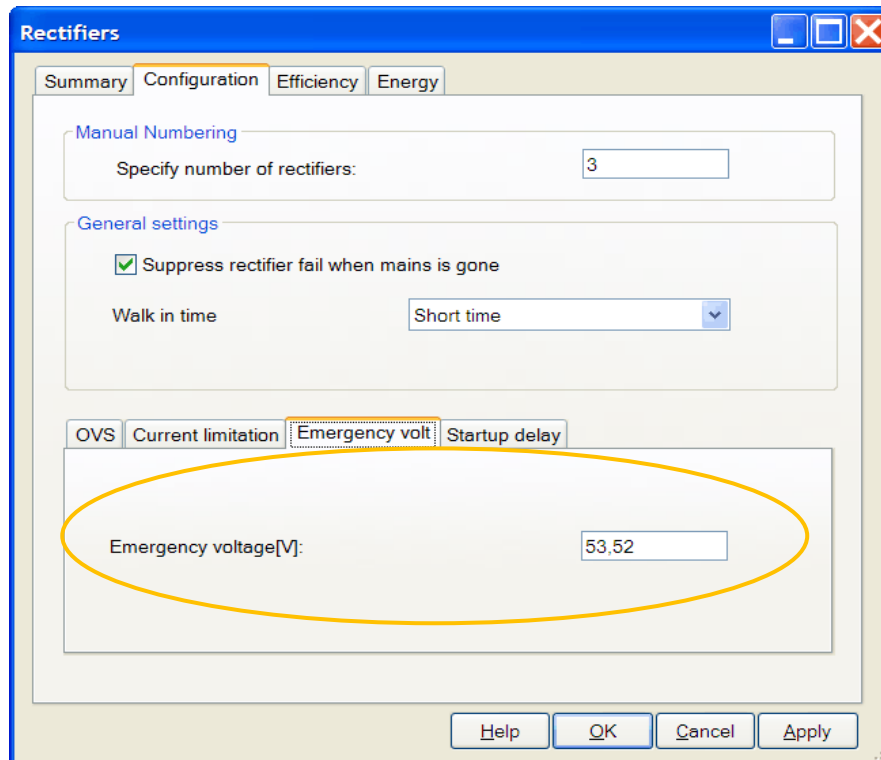
Rectifier Emergency Voltage

The system controller uses the Rectifier Emergency Voltage for security or site specific reasons.

The controller “commands” the rectifiers, via the CAN bus, to **reduce their output voltage to a lower value** than the default (53.5VDC).

Using the controller’s keypad or other GUI, you can set the Emergency Voltage to a suitable value lower than the default output voltage.

Then the action **can be enabled externally**, e.g. using a programmable input to inform the controller to activate this function.



Example of Rectifier Emergency Voltage configuration in *PowerSuite*

Rectifiers Current Sharing

Current sharing functionality is a useful feature that **divides the rectifiers' total output current equally among all the rectifiers**.

Current sharing extends the rectifiers' operating life, and enables better load balance of the AC phase currents. Also, this feature has the advantage of distributing the MTBF value (mean time between failures) equally throughout the power system.

The rectifiers automatically **adjust their output currents**, so that they are as close as possible **to the mean rectifier output current** (rectifiers' total output current divided by the number of rectifiers).

The "RectCurrShareErr" alarm monitor observes the rectifiers' current sharing, and indicates the worst percentage of deviation from the *mean rectifier output current*.

E.g.: A power system implemented with 4 rectifiers delivers 100A to the load and batteries. The *mean rectifier output current* is then 25A.

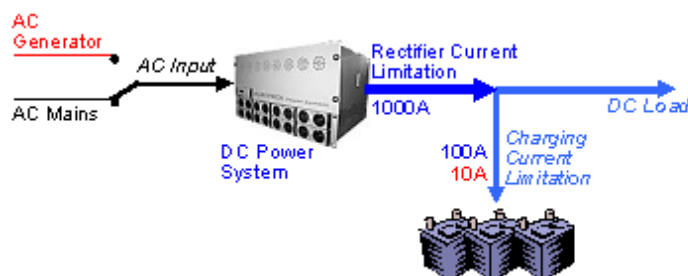
A rectifier delivering 12.5A will be indicated by the "RectCurrShareErr" alarm monitor with a value of -50%.

Typical current sharing alarm limits are between $\pm 2.5\%$ to $\pm 5\%$ at full load. But the **active current sharing**, implemented by digital CAN bus communication among rectifiers, makes it possible to achieve very accurate current sharing between rectifiers, even better than $\pm 2.5\%$ at full load.

Rectifiers Current Limitation

This function is used **limit the total current output** (load current and battery charging current) **from the rectifiers**.

By adjusting the limits for the Rectifier Current Limitation and or the Battery Charging Current Limitation, you can have some control of the DC load current.



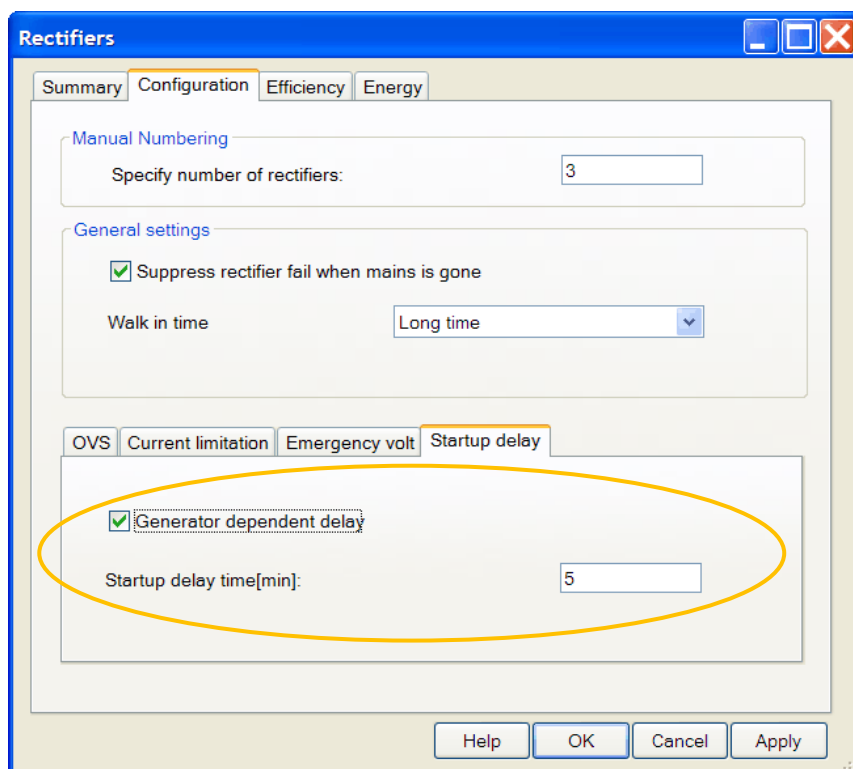
Read also the topic “[Battery Charging Current Limitation](#)” on page 317.

Rectifiers Start-up Delay

The “Start-up Delay” function will **delay the start of the rectifiers**, after an AC mains outage. When this delay time has passed, the configured rectifiers’ Walk-in Time function will be activated, thus enabling a “softer” rectifiers start-up.

This function is used to **reduce battery damage, caused by very large in-rush currents** at AC connection and reconnections to the system’s Mains input, especially when running on low current supply AC sources (solar panels, AC generators, etc).

Use the controller’s keypad or other GUI to configure the power system’s rectifiers with a “Start-up Delay”, when AC mains is reconnected after a mains outage.



Example of Rectifier Start-up Delay configuration in *PowerSuite*

The checkbox “connects” the delay to the controller’s Generator event.

Read more in the hybrid site example in topic “[Step 8- Optionally, configure rectifiers’ start-up delay](#)” on page 272.

Firmware Upgrade - Rectifiers

The *FWLoader* program helps you upgrade the firmware installed in your power system’s control units, such as controller, rectifiers and other CAN Bus nodes.

NOTICE:
Contact the *Eltek* Service Dep. if you need to upgrade the rectifier’s firmware or any CAN Bus control units other than controllers.

FWLoader Online Help helps you using the *FWLoader* graphical user interface (GUI).

Read more “[About the FWLoader Program](#)” on page 337.

Solar Functions

This section explains the generic functionality implemented when the DC power system is fed from photovoltaic solar panels (PV panels), especially in hybrid and autonomous systems.

Read also “[About Hybrid Systems](#)” on page 260.

Load Functions

This section explains the functionality related to the system's DC load.

Load Groups

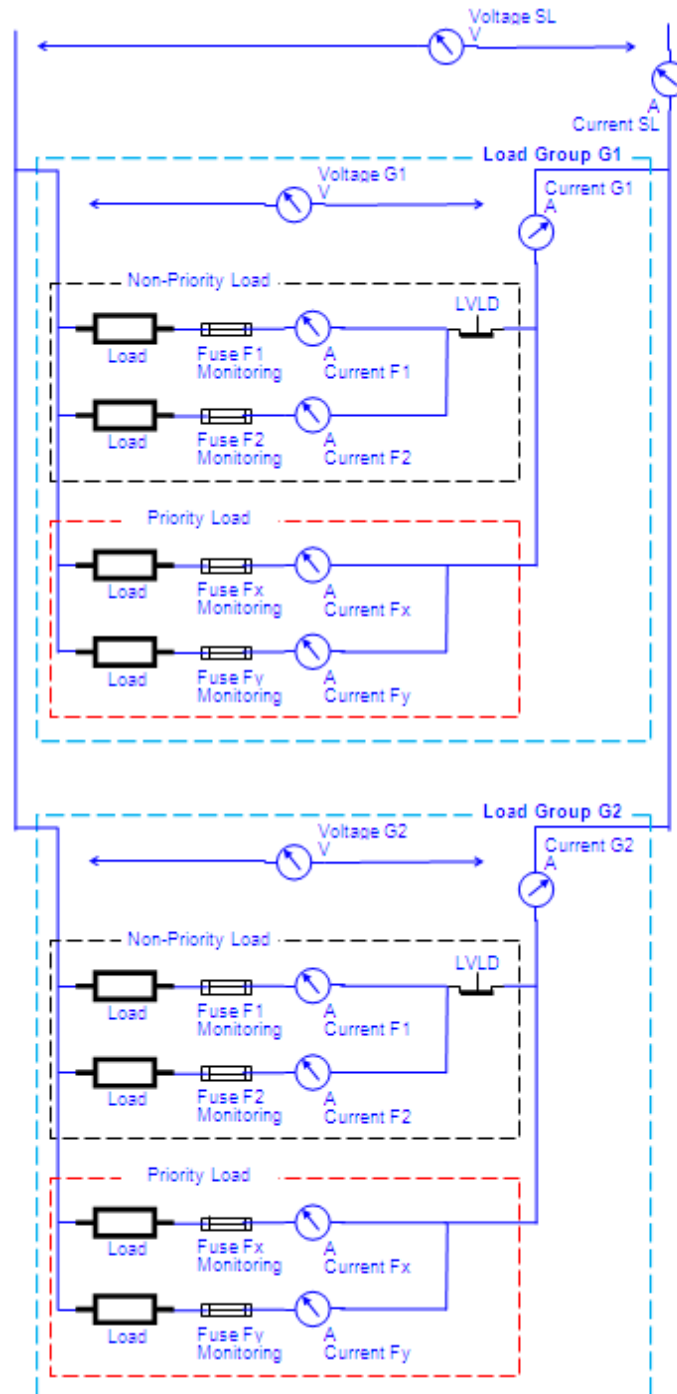
Normally, the power system's total number of Priority and Non-Priority DC load circuits are considered as one Load Group.

A **Load Group** consists of **one or several** priority and or non-priority **DC load circuits**. See the diagram in topic "[Overview Load Measurements](#)" on page 289.

Usually, one Load Group is monitored by one *Smartpack* or *Smartpack2 Basic* controller (implements LVLDC contactors) and one or several Load Monitor modules (implements current and fuse monitoring). Refer to the topic "[System Inputs and Outputs - Overview](#)" on page 349.

Overview Load Measurements

DC power systems may be implemented with one or several Load Groups, each consisting of one or several priority and or non-priority DC load circuits.



Overview of a power system's DC load measurements.

The *Smartpack* and *Smartpack2 Basic* controllers implement LVLD contactors, and Load Monitor modules implement current and fuse monitoring.

Depending on how many controllers and shunts you have implemented in the power system, you can carry out the following DC load measurements: (refer also to the figure above)

For all the power System's Load Groups

- Voltage SL
- Current SL

For each Load Group

- Voltage Gx
- Current Gx

For each Non-Priority and Priority DC Load Circuit:

- Current Fx
- Fuse monitoring Fx

Read also about “[Load Groups](#)” on page 289, and the topic “[System Inputs and Outputs - Overview](#)” on page 349.

NOTICE:

In general, the total DC load -- of power systems implemented with one controller -- represent one Load Group.

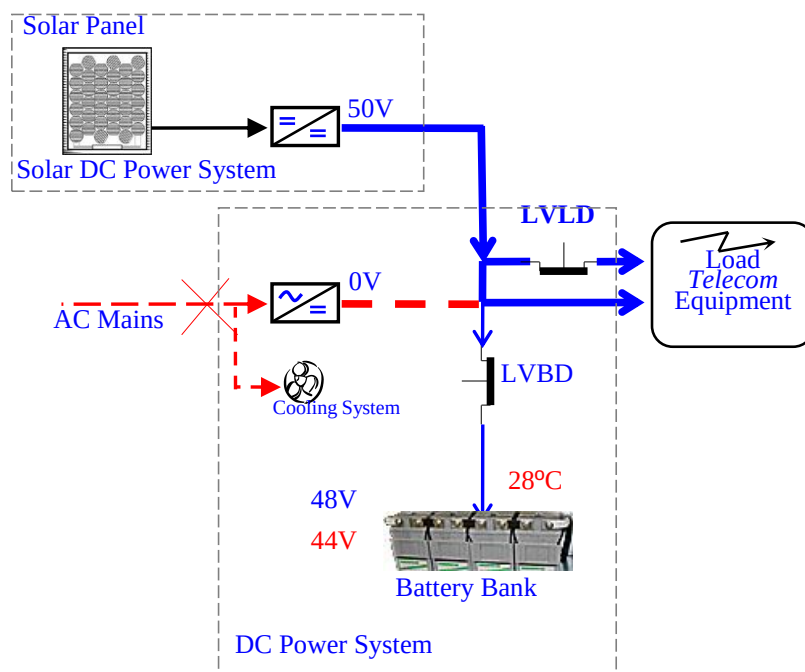
The total DC load of larger, multi-cabinet power systems -- implemented with several controllers in interconnected cabinets -- are divided into several Load Groups, as many load groups as there are controllers.

LVLD ~ Non-Priority Load Disconnection

To extend the power system’s battery bank capacity, during a critical condition - - or when the load’s backup leasing time has expired -- the system’s controller disconnects and reconnects the non-priority load output circuits using the LVLD contactor.

The example in the figure shows a fan cooled DC power system with Mains failure, using a solar system as an additional primary supply.

For information about the example’s voltage limits and criteria, read the topic “[Typical Parameters for Alarm Monitors](#)” on page 326 or the [LVLD dialog box](#) (page 103) topic in *PowerSuite Help*.



In the example, the system’s controller **trips the LVLD contactor** (disconnects the non-priority load circuits) when the following conditions are met:

- The AC Mains supply fails (critical condition)

AND

- The battery voltage has dropped down to e.g. 44V (Disconnect Voltage)

OR

- The non-priority load's backup leasing time has expired (Disconnect Delay Time)

In the example, the system's controller **reconnects the LVLD contactor** when all the following conditions are met:

- A. The AC Mains supply is ON again (Normal Condition and **Mains Dependent**)
- B. The LVLD contactor has been disconnected longer than the **Delay After Disconnect** period of time
- C. The rectifier system output voltage has risen to e.g. 48V (**Reconnect Voltage**)

NOTICE: In this example -- while the Mains supply is OFF -- an additional solar system may recharge the battery bank. The LVLD contactor will NOT be reconnected because the Mains supply is still OFF (**condition A**). In this situation, the controller may reconnect the LVLD contactor, if you **check the "Mains Independent" option**, which you find in the [LVLD dialog box](#) (page 103) in *PowerSuite Help*.

Load Current Calculation

The **load current is calculated** by the controller, not measured.

Even though *PowerSuite* uses the "**LoadCurrent**" alarm monitor to raise alarms when the load current surpasses the current limits, the alarm monitor is not used to "measure" the current (no load shunt).

The system controller calculates the load current as the difference between the rectifier current (RectifierCurrent) and the battery current (BatteryCurrent).

The controller reads the battery shunt to find the battery current. It reads the rectifiers' internal shunts to find the total rectifier system output current. Thus, the controller can calculate the load current.

During battery charging, the battery current is defined as positive (+); during discharge, it is defined as negative (-).

During battery charging,

$$I_{REC} = I_{LOAD} + I_{BAT}$$

This means that:

$$I_{LOAD} = I_{REC} - I_{BAT}$$

When the system is running on batteries, $I_{REC}=0A$.

$$I_{LOAD} = 0 - (-I_{BAT})$$

$$I_{\text{LOAD}} = I_{\text{BAT}}$$

Battery Functions

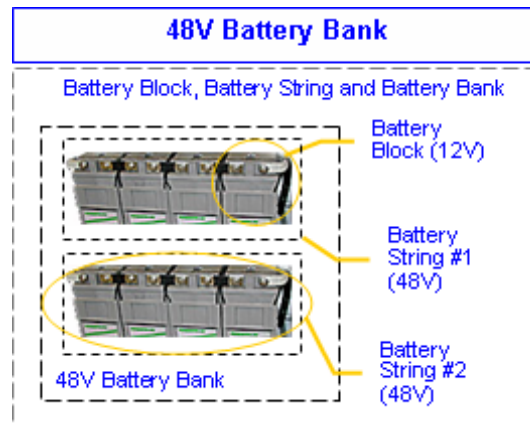
This section explains topics associated to the DC power system's battery banks.

Battery Banks, Strings and Blocks

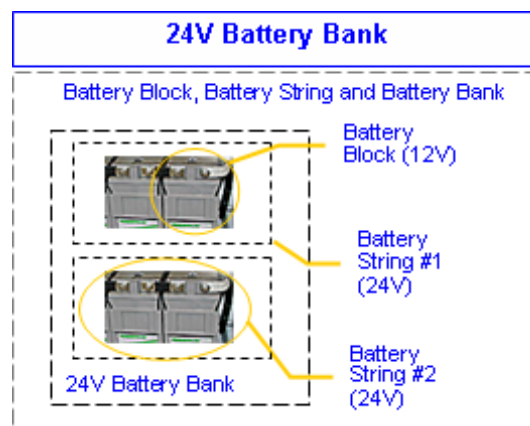
Normally, **battery banks** are implemented by connecting **several battery strings in parallel**.

Each **battery string** is formed by **battery blocks connected in series**.

The **battery block** is manufactured with two or more **battery cells**.



*Example of a **48V battery bank** implemented with two 48V battery strings; each string consists of four 12V battery blocks, each block consists of six 2V-battery cells. **48V battery strings** are then implemented with **24 such battery cells**.*



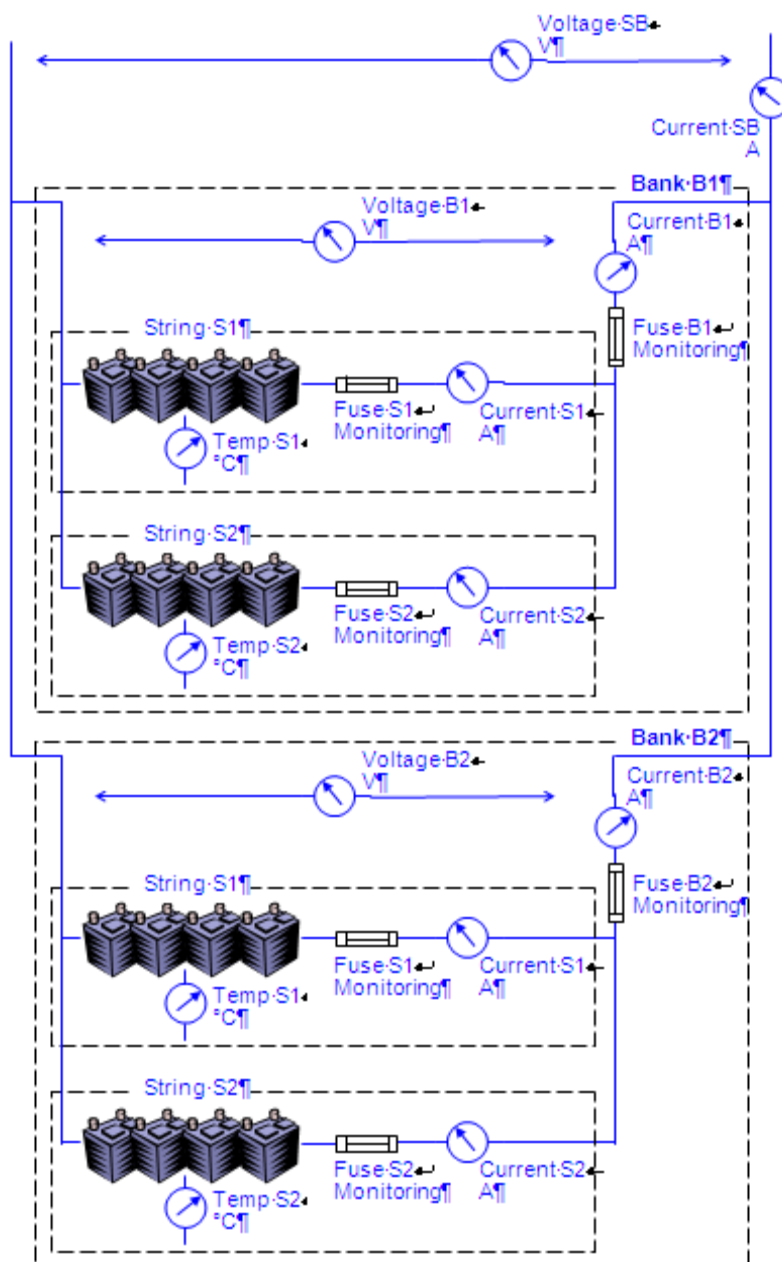
*Example of a **24V battery bank** implemented with two 24V battery strings; each string consists of two 12V battery blocks, each block consists of six 2V-battery cells. **24V battery strings** are then implemented with **12 such battery cells**.*

Similarly, a **60V battery bank** could be implemented with one or several 60V battery strings; each string consists of five 12V battery blocks, each block consists of six 2V-battery cells.

The **60V battery strings** consists then of **30 such battery cells**.

Overview Battery Measurements

DC power systems may be implemented with one or several battery banks, each consisting of one or several battery strings.



Overview of the power system's battery measurements.

Depending on how many controllers and shunts you have implemented in the power system, you can carry out the following battery measurements:

For all the power System's Battery banks

- Voltage SB
- Current SB

For each battery Bank

- Voltage Bx
- Current Bx
- Fuse monitoring Bx

For each battery String

- Current Sx
- Fuse monitoring Sx
- Temperature Sx

Read also about “[Battery Banks, Strings and Blocks](#)” on page 294, and the topic “[System Inputs and Outputs - Overview](#)” on page 349.

Battery Commands

This logical subgroup lets you issue or activate **specific commands related to the power system’s battery bank**. For example, following commands might be available in *Smartpack2 Master Controller*’s submenu:

Commands > **Battery Commands**

#	Description	Action	Unit/Label	Note
	Start Battery Test	☐	No	Read about “ Battery Test Start Methods ” on page 312
	Stop Battery Test	☐	No	
	Start Battery Boost	☐	No	Read about “ Battery Boost Charging ” on page 315
	Stop Battery Boost	☐	No	

Issuing **commands is allowed** using a Pin-Code.

NOTICE:

The default Service Access Level password or Pin-Code is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

Battery Symmetry Measurements

Symmetry measurement is a battery monitoring method for automatically detecting unbalanced battery blocks, due to battery cell failure. Symmetry monitoring of a battery string may be performed after three different methods:

- **Block measurement method**
Measuring each battery block
- **Mid-point measurement method**
Measuring from the mid-point of the battery string to one end
- **Double mid-point measurement method**
Measuring from the mid-point of the string to both ends

DC power systems may be implemented with **dedicated inputs for battery symmetry measurements**.

Smartpack-based systems can use dedicated inputs on the *Smartpack* controller (internal) and or on Battery Monitors connected to the CAN bus (external).

Smartpack2-based systems and **Compack-based systems** implement battery symmetry measurements using Battery Monitors connected to the CAN bus (external).

Read also about the *Smartpack* controller's "[Available Inputs and Outputs](#)" on page 356 and about "[The Battery Monitor Control Unit - Overview](#)" on page 360.

Symmetry in 48V Systems

Battery symmetry in 48V power systems is implemented using inputs on Battery Monitors connected to the CAN bus (external).

In *Smartpack*-based systems, you can also use dedicated inputs on the *Smartpack* controller (internal).

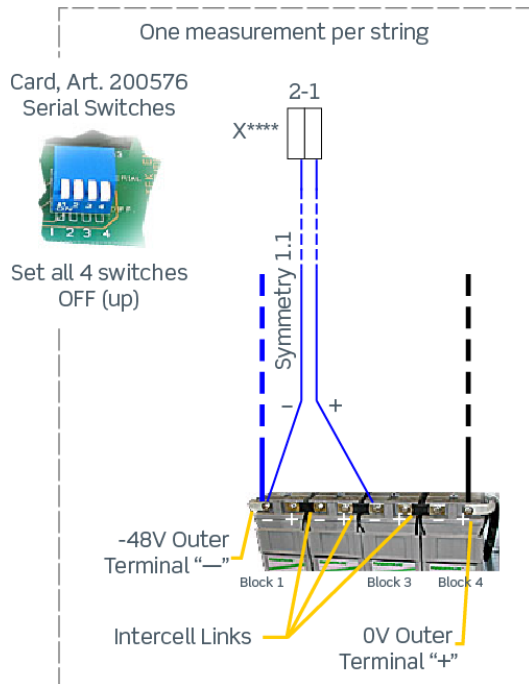
Read also about the *Smartpack* controller's "[Available Inputs and Outputs](#)" on page 356 and about "[The Battery Monitor Control Unit - Overview](#)" on page 360.

Smartpack's Battery Symmetry Connections, 48V

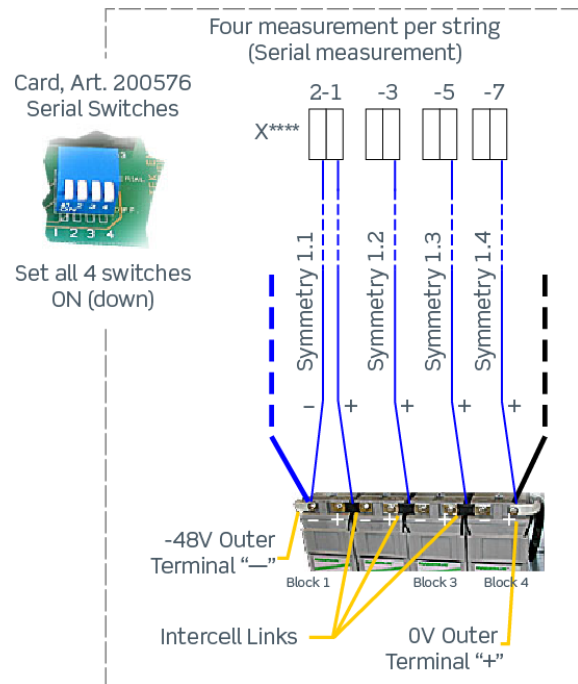
Smartpack-based power systems have dedicated inputs on the *Smartpack* controller (internal) for battery symmetry measurements. The systems are normally delivered with the symmetry measurement method and the number of measurement points already preprogrammed in the controller. Any deviation from factory settings requires Symmetry reconfiguration via the *PowerSuite* PC program.

Refer to the *PowerSuite Help*, for symmetry reconfiguration, or when configuring *Battery Monitor Control Units*.

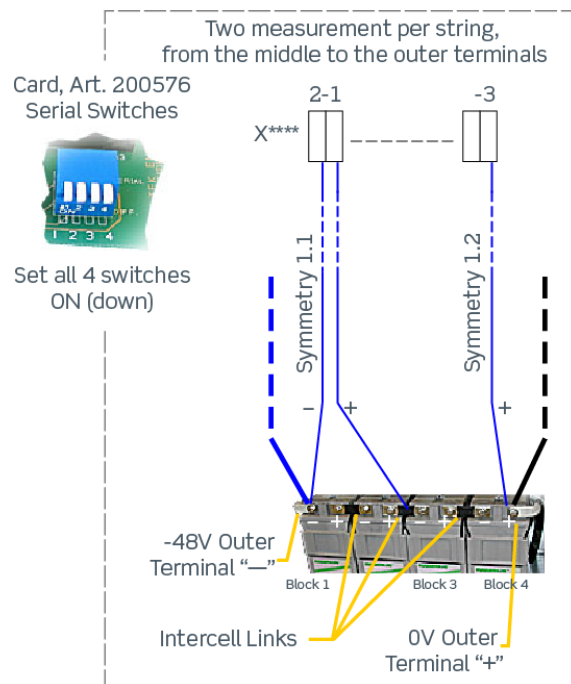
Battery Symmetry ~ Mid-point Measurement Smartpack Controller, -48V Systems



Battery Symmetry ~ Block Measurement Smartpack Controller, -48V Systems



Battery Symmetry ~ Double-point Measurement Smartpack Controller, -48V Systems



Example of terminal connection points for the Smartpack controller's Symmetry **Block**, **Mid-point** and **Double Mid-Point Measurement Methods** in 48V DC power systems

The *mid-point measurement method* requires 2 symmetry wires per battery string; the *double mid-point measurement method* requires 4 symmetry wires per battery string, while the *block measurement method* requires 8 symmetry wires per battery string.

Notice:

If you open the serial switches in card, Art. 200576 -- setting all to OFF (up) -- you have to connect the + and – wires of every symmetry input.

Each *Smartpack* controller is equipped with 8 battery symmetry inputs (on CON4 and CON3), enabling symmetry measurement of:

- 2 battery strings (block meas. method)
- 4 battery strings (double mid-point meas. method)
- 8 battery strings (mid-point meas. method)

You can implement any of these methods using one or two *Battery Connection Kits* and the appropriate number of *Battery Symmetry Kits*, which contain a single wire with suitable cable lugs, etc.

Refer to the system's quick start guide for connection details, and for using fewer wires, setting the switches to ON.

Read also about "[The Battery Monitor Control Unit - Overview](#)" on page 360.

Battery Monitor's Symmetry Connections, 48V Block M

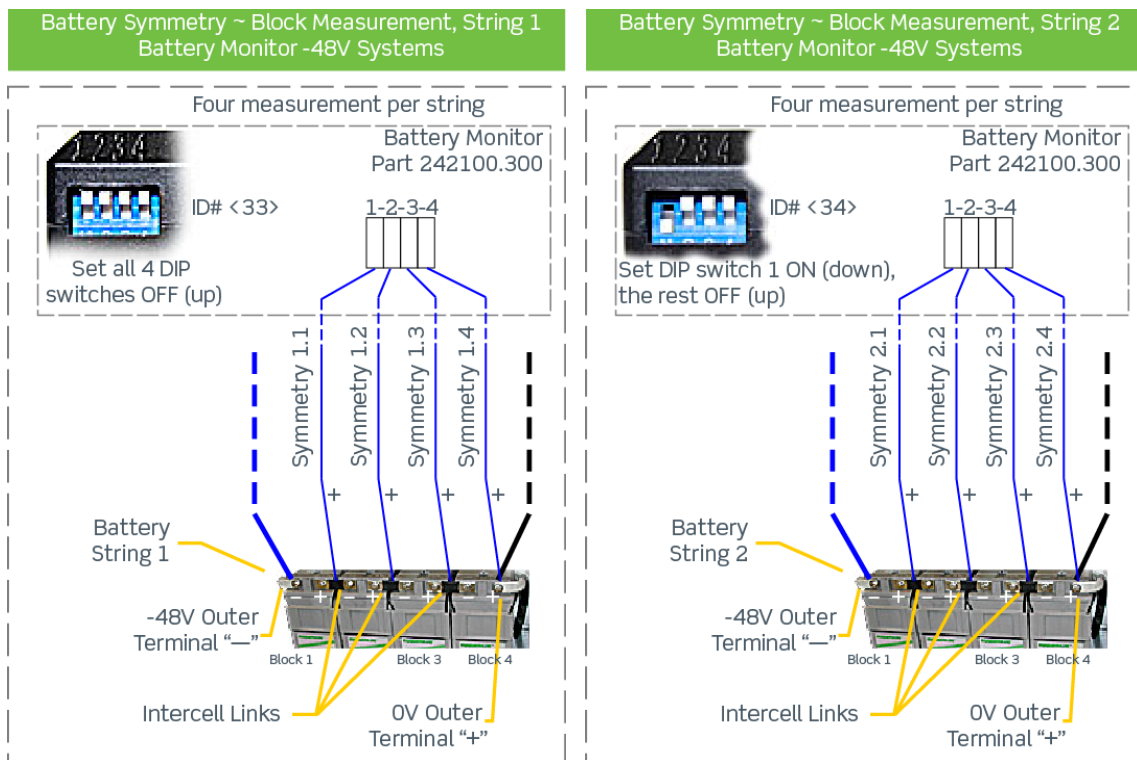
Power systems can use the inputs in Battery Monitors -- connected to the CAN bus -- for battery symmetry measurements.

Each *Battery Monitor* is equipped with 4 battery symmetry inputs, enabling symmetry measurement of 1 battery string using the **Block Measurement Method**.

Read the "*Installation Guide Battery Monitor CAN Node*", document number 351507.033.

Refer also to "*Installation Guide Battery Monitor – Symmetry Kit*", document number 351497.033, which is included with the kit. The Battery Fuse and Battery Current cables are not shipped with the *Battery Monitor ~ Symmetry Kit*.

Refer to the *PowerSuite Help* for symmetry configuration of *Battery Monitor Control Units*.



*Example of Battery Symmetry Connections using the **Block Measurement Method**
with Battery Monitors in 48V DC power systems*

Notice:

Always connect Battery Monitor with ID#<33> to battery string 1 (lowest), with ID#<34> to string 2, and so on. *PowerSuite* will then refer to the correct battery string.

Read also about "[The Battery Monitor Control Unit - Overview](#)" on page 360.

Battery Monitor's Symmetry Connections, 48V Mid-Point M

Power systems can use the inputs in Battery Monitors -- connected to the CAN bus -- for battery symmetry measurements.

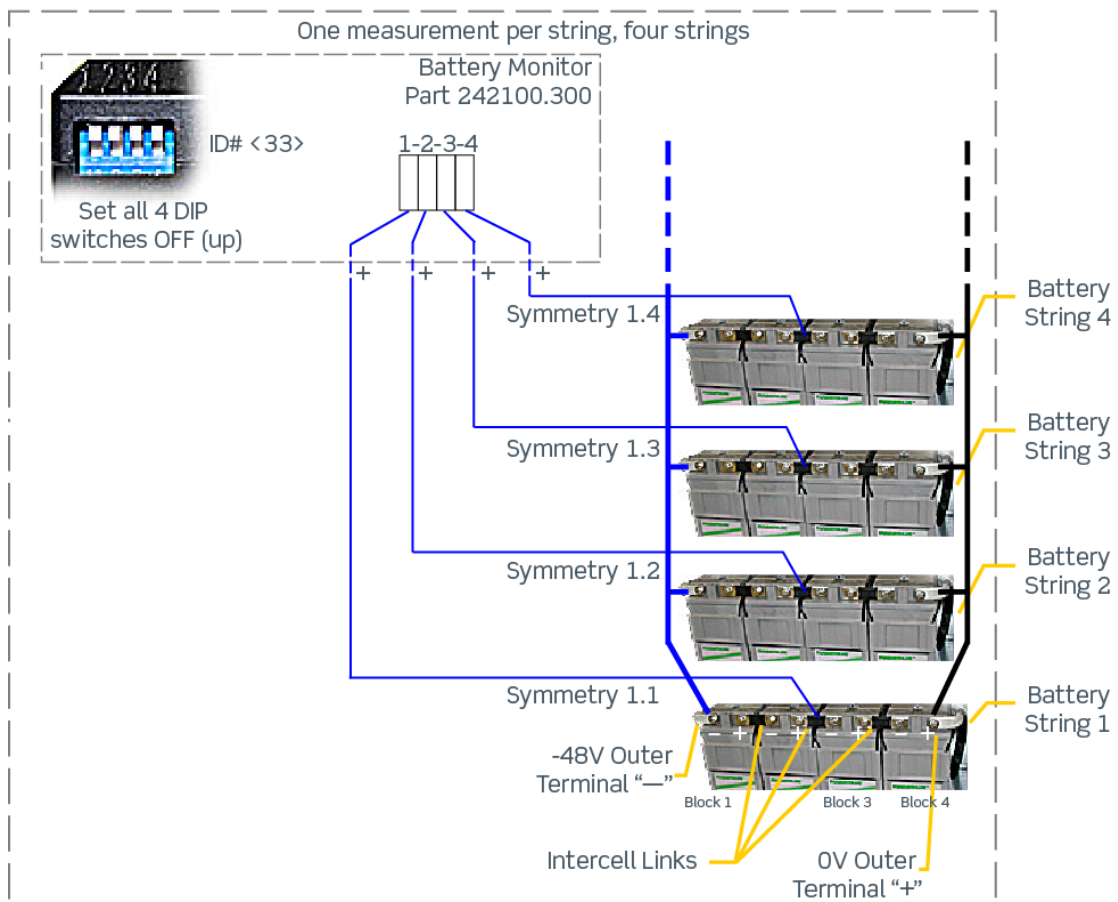
Each *Battery Monitor* is equipped with 4 battery symmetry inputs, enabling symmetry measurement of 4 battery strings using the **Mid-Point Measurement Method**.

Read the "*Installation Guide Battery Monitor CAN Node*", document number 351507.033.

Refer also to "*Installation Guide Battery Monitor – Symmetry Kit*", document number 351497.033, which is included with the kit. The Battery Fuse and Battery Current cables are not shipped with the *Battery Monitor ~ Symmetry Kit*.

Refer to the *PowerSuite Help* for symmetry configuration of *Battery Monitor Control Units*.

Battery Symmetry ~ Mid-point Measurement, String 1 to 4 Battery Monitor -48V Systems



*Example of Battery Symmetry Connections using the **Mid-Point Measurement Method** with Battery Monitors in 48V DC power systems*

Notice:

Always connect Battery Monitor with ID#<33> to battery strings 1 (lowest), 2, 3 and 4. Then Battery Monitor with ID#<34> to string 5, 6, 7 and 8. And so on. *PowerSuite* will then refer to the correct battery string.

Symmetry in 24V Systems

Battery symmetry in +24V power systems is implemented using inputs on Battery Monitors connected to the CAN bus.

In *Smartpack*-based systems, you can also use dedicated inputs on the *Smartpack* controller.

Read also about the *Smartpack* controller's "[Available Inputs and Outputs](#)" on page 356 and about "[The Battery Monitor Control Unit - Overview](#)" on page 360.

You may also find useful reading the topic "[About Negative & Positive DC Distribution Systems](#)" on page 246.

Smartpack's Battery Symmetry Connections, 24V

Smartpack-based power systems have dedicated inputs on the Smartpack controller for battery symmetry measurements. The systems are normally delivered with the symmetry measurement method and the number of measurement points already preprogrammed in the controller. Any deviation from factory settings requires Symmetry reconfiguration via the *PowerSuite* PC program.

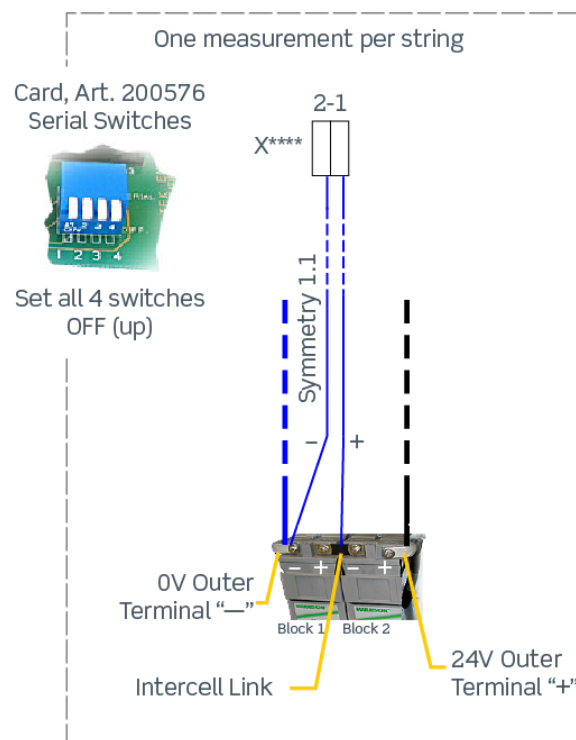
Refer to the *PowerSuite Help*, for symmetry reconfiguration, or when configuring *Battery Monitor Control Units*.

In +24V power systems using 12V battery blocks, the **Mid-Point Measurement Method** and the **Block Measurement Method** are equal, as the strings consist of only two battery blocks. Only 2 symmetry wires per battery string are required.

Each Smartpack controller is equipped with 8 battery symmetry inputs (on connectors CON4 and CON3), enabling symmetry measurement of 8 battery strings using the *Mid-Point* or *Block Measurement Method*.

You can implement any of these methods using one or two *Battery Connection Kits* and the appropriate number of *Battery Symmetry Kits*, which contain a single wire with suitable cable lugs, etc.

Battery Symmetry ~ Block or Mid-point Measurement Smartpack Controller, +24V Systems



*Example of terminal connection points for the Smartpack controller's Symmetry **Block or Mid-Point** measurement methods in 24V DC power systems*

Refer to the system's quick start guide for connection details, and to the *PowerSuite Help*, for symmetry reconfiguration, or when configuring *Battery Monitor Control Units*.

Battery Monitor's Symmetry Connections, 24V

Positive 24V power systems can use the inputs in Battery Monitors -- connected to the CAN bus -- for battery symmetry measurements.

WARNING:

In +24V systems, the Battery Monitors are to be connected to the CAN bus via a CAN Repeater module and a CAN Power module. Also, the Battery Monitor's firmware 402086.009 must be version 1.03 or newer.

In +24V power systems using 12V battery blocks, the **Mid-Point Measurement Method** and the **Block Measurement Method** are equal, as the strings consist of only two battery blocks.

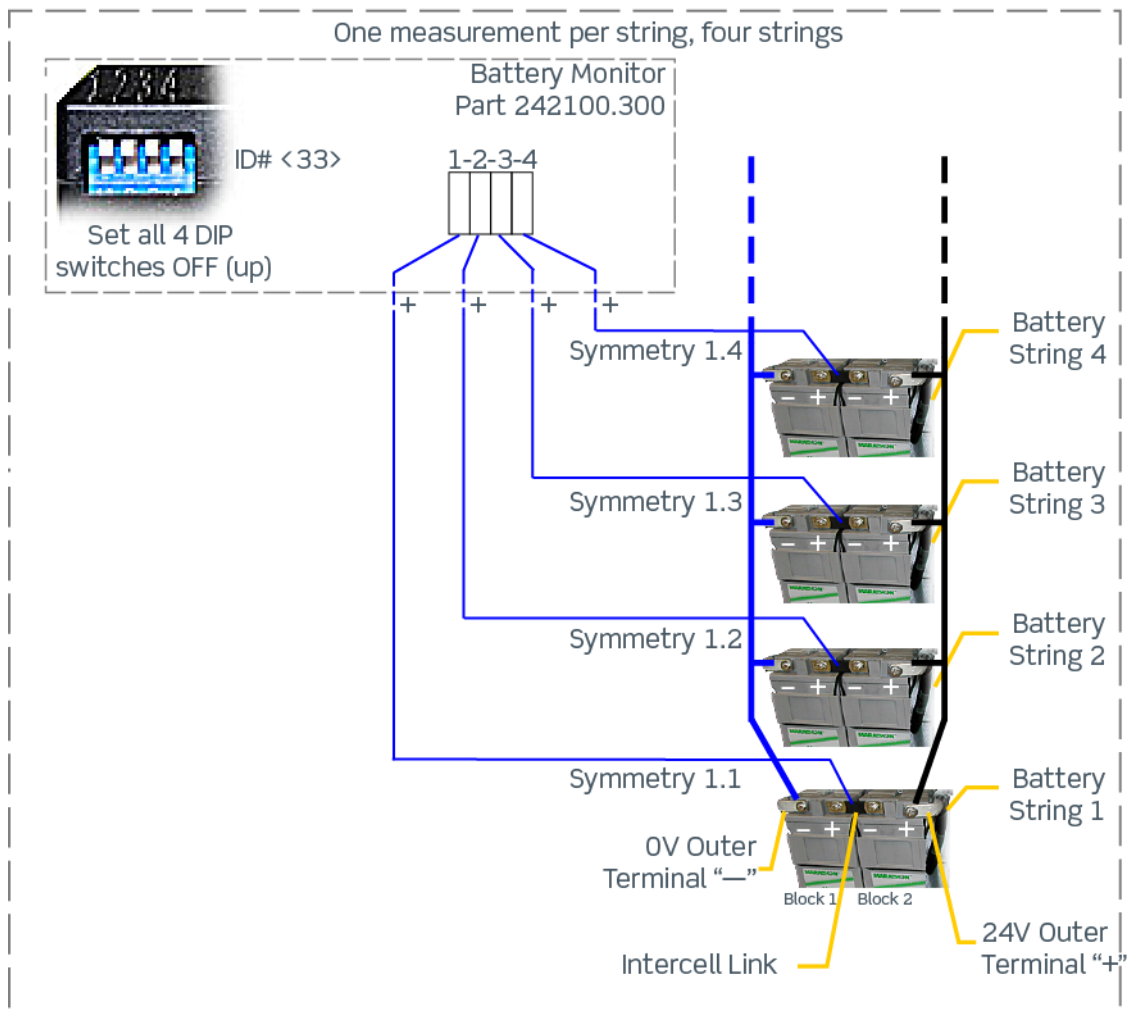
Each *Battery Monitor* is equipped with 4 battery symmetry inputs, enabling symmetry measurement of 4 battery string using the **Mid-Point** or **Block Measurement Methods**.

Read the “*Installation Guide Battery Monitor CAN Node*”, document number 351507.033.

Refer also to “*Installation Guide Battery Monitor – Symmetry Kit*”, document number 351497.033, which is included with the kit. The Battery Fuse and Battery Current cables are not shipped with the *Battery Monitor ~ Symmetry Kit*.

Refer to the *PowerSuite Help* for symmetry configuration of *Battery Monitor Control Units*.

Battery Symmetry ~ Block or Mid-point Measurement, String 1 to 4 Battery Monitor +24V Systems



Example of Battery Symmetry Connections using **Block or Mid-Point measurement methods** in 24V DC power systems

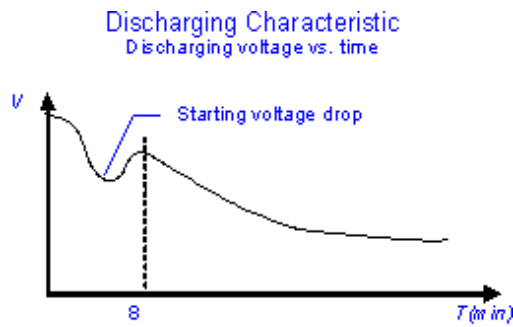
Notice:

Always connect Battery Monitor with ID#<33> to battery strings 1 (lowest), 2, 3 and 4. Then Battery Monitor with ID#<34> to string 5, 6, 7 and 8. And so on. *PowerSuite* will then refer to the correct battery string.

Refer to the system's quick start guide for connection details, and to the *PowerSuite Help*, for symmetry reconfiguration, or when configuring *Battery Monitor Control Units*.

Symmetry Measurements during Discharge Mode

Symmetry measurements may be performed both during the batteries recharge and discharge modes (Continuous Symmetry Mode).



To obtain more realistic and accurate results, the symmetry measurements should be performed when the batteries are in discharge mode (Discharge Symmetry Mode).

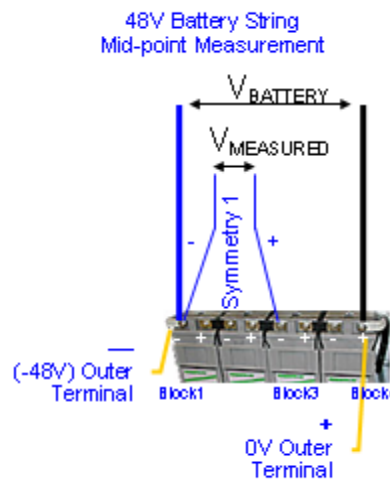
But the battery voltage is quite unstable during the transition from recharge to discharge mode, and the measurements should be delayed until the voltage has stabilized (Discharge Delay)

Battery Symmetry Calculations

Symmetry measurement is a battery monitoring method for automatically detecting unbalanced battery blocks. Read also “[Battery Symmetry Measurements](#)” on page 296.

Mid-point Measurement Calculation -- Example

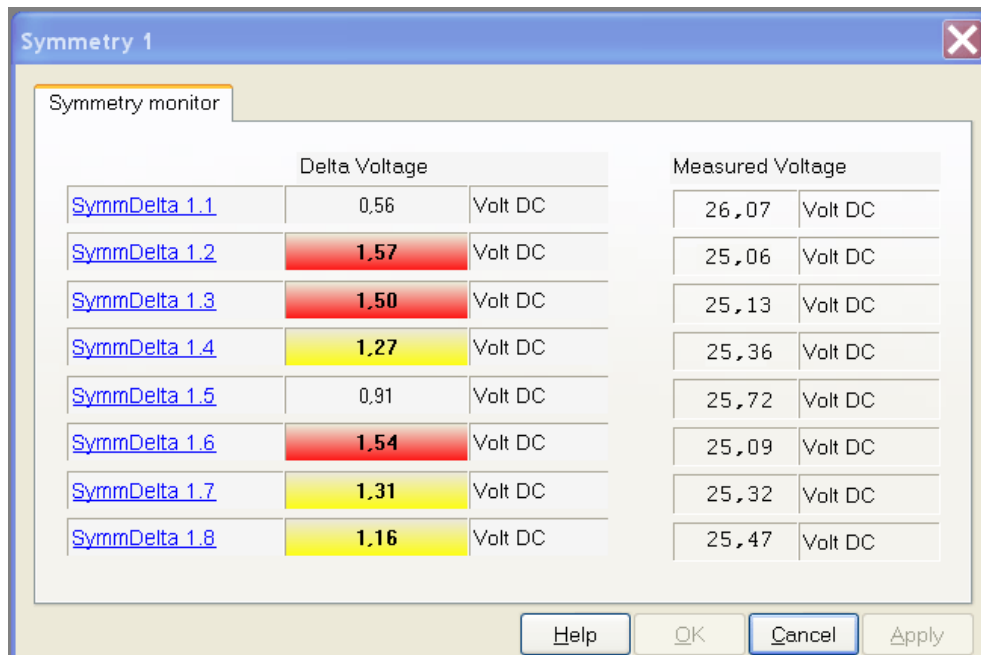
This example describes how *PowerSuite* calculates the battery symmetry of a 48V battery bank with 8 battery strings, and using the mid-point measurement method (24V). The example requires 8 symmetry inputs and alarm monitors.



Symmetry 1 measurement for battery string 1

The battery bank’s voltage is 53.26V, and is displayed by the “BatteryVoltage” alarm monitor in the Power Summary pane in *PowerSuite*.

The *PowerSuite* Symmetry dialogue box displays the 8 “SymmDelta x.x” alarm monitors’ status and voltages as follows:



The 8 “SymmDelta x.x” alarm monitors are configured to generate alarms when the Delta voltage is 1.5V (Major Alarm) and 1.0V (Minor Alarm). Clicking on the monitors name you can check their configuration.

The calculation is based on following formula:

$$(V_{\text{BATTERY}} / 2) - V_{\text{MEASURED}} = | V_{\text{DELTA}} |$$

For the first “SymmDelta 1.1” monitor, *PowerSuite* calculates as follows:

$$(53.26 \text{ V} / 2) - 26.07 \text{ V} = | 0.56 \text{ V} |$$

The “SymmDelta 1.1” monitor in *PowerSuite* determines that symmetry voltage is correct, as the delta voltage is below the monitor’s configured Minor Alarm limit:

$$1.0\text{V} > | 0.56 \text{ V} |$$

The “SymmDelta 1.2” monitor in *PowerSuite* determines that symmetry voltage is incorrect, as the delta voltage is over the monitor’s configured Major Alarm limit:

$$1.5\text{V} < | 1.57 \text{ V} |$$

The “SymmDelta 1.4” monitor in *PowerSuite* determines that symmetry voltage is incorrect, as the delta voltage is over the monitor’s configured Minor Alarm limit, but below the Major Alarm limit:

$$1.5\text{V} > | 1.27 \text{ V} | > 1.0\text{V}$$

Block Measurement Calculation -- Example

This example describes how *PowerSuite* calculates the battery symmetry of a 48V battery bank with 2 battery strings, and using the block measurement

The battery bank's voltage is 54.00V, and is displayed by the "BatteryVoltage" alarm monitor in the Power Summary pane in *PowerSuite*.

Symmetry 1

Symmetry monitor

	Delta Voltage		Measured Voltage	
SymmDelta 1.1	0,94	Volt DC	12,56	Volt DC
SymmDelta 1.2	2,31	Volt DC	11,19	Volt DC
SymmDelta 1.3	1,17	Volt DC	12,33	Volt DC
SymmDelta 1.4	1,09	Volt DC	12,41	Volt DC
SymmDelta 1.5	0,81	Volt DC	12,69	Volt DC
SymmDelta 1.6	2,26	Volt DC	11,24	Volt DC
SymmDelta 1.7	1,19	Volt DC	12,38	Volt DC
SymmDelta 1.8	1,04	Volt DC	12,46	Volt DC

Help OK Cancel Apply

The calculation is based on following formula:

$$(V_{\text{BATTERY}} / 4) - V_{\text{MEASURED}} = |V_{\text{DELTA}}|$$

$$(54.00 \text{ V} / 4) - 12.56 \text{ V} = | 0.94 \text{ V} |$$

The “SymmDelta 1.1” monitor in *PowerSuite* determines that symmetry voltage is correct, as the delta voltage is below the monitor’s configured Minor Alarm limit:

$$1.0V > | 0.94 V |$$

The “SymmDelta 1.2” monitor in *PowerSuite* determines that symmetry voltage is incorrect, as the delta voltage is over the monitor’s configured Major Alarm limit:

$$1.5V < | 2.31 V |$$

The “SymmDelta 1.4” monitor in *PowerSuite* determines that symmetry voltage is incorrect, as the delta voltage is over the monitor’s configured Minor Alarm limit, but below the Major Alarm limit:

$$1.5V > | 1.09 V | > 1.0V$$

Battery Tables

PowerSuite enables you to select a specific Battery Definition Table to upload to the controller.

Refer also to the [Battery Table Data dialog box](#) (page 136) topic, in *PowerSuite Help*.

Battery Table Data

Select battery table: Battery table 1 Get data

Battery Table

Description: Fiamm SLA100

High end volt[V/cell]: 1,90 (ref 1)

Low end volt [V/cell]: 1,75 (ref 2)

Minutes	Current ref1	Current ref2
1	222,0	392,0
5	184,0	300,0
10	151,0	216,0
15	127,0	169,0
20	110,0	141,0
30	89,0	106,0
47	69,0	87,7
60	56,1	63,3
90	40,7	45,5
120	31,9	36,0
180	22,8	26,3
240	18,1	20,9
300	15,2	17,5
480	10,2	12,2
600	8,4	10,1

Add row Delete row Import from file... Export to file...

Help OK Cancel Apply

In this dialogue box, you can select, edit, export and import battery tables.

How to Select Tables

You can select battery tables, clicking on the drop-down arrow, then selecting the table and clicking on the “Get Data” button. Following battery tables are available:

- **Eltek Standard**
A non-editable battery definition table created by *Eltek* from an average of commonly used battery tables
- **Battery Table 1**
An editable battery definition table for Fiamm SLA100 batteries. You can adapt the table to the discharge performance of the system’s battery bank, by changing, adding or removing rows of data. You can also edit the table Description, the High and Low End Voltage values.
- **Battery Table 2**
An editable battery definition table for M12V155FT batteries. You can adapt the table to the discharge performance of the system’s battery bank, by changing, adding or removing rows of data. You can also edit the table Description, the High and Low End Voltage values.
- **Import a Battery Table from a file** in your computer.
The file must have the TBL format

Discharge Performance Data

You can find the discharge performance data for a certain battery type, by reading the manufacturer’s battery data sheet.

A battery definition table in *PowerSuite* consists of a name and two sets of discharge data at different periods of time. One set refers to the “Ref 1” end-of-discharge voltage and the other set to the “Ref 2” end-of-discharge voltage.

The table consists of following editable parameters:

- A “Description” or table name.
Type a name that describes the battery type that the table defines
- Two different end-of-discharge voltages, “High End Volt” (Ref 1) and “Low End Volt” (Ref 2)
- A three columns table:
 1. The discharge period of time in “Minutes”
 2. For the “High End Volt” (Ref 1) end-of-discharge voltage, the current in ampere at different discharge times
 3. For the “Low End Volt” (Ref 2) end-of-discharge voltage, the current in ampere at different discharge times

- ✓ The “BatteryQuality” and “BatteryTotCap” alarm monitors use the performance data on the battery table’s “Current ref 1” column.
- ✓ The “BatteryRemCap” and “BatteryTimeLeft” alarm monitors use the performance data on the battery table’s “Current ref 2” column.
- ✓ You find the alarm monitors in the [Battery dialog box](#) (page 105), on the “Status” tab, in *PowerSuite Help*

How to Use or Save the Table

You can do the following with the selected battery table:

- Click the **“Export to File”** button to export the Battery Table to a file in your computer. Thus, saving a backup copy of the adapted battery table to the computer.

OR

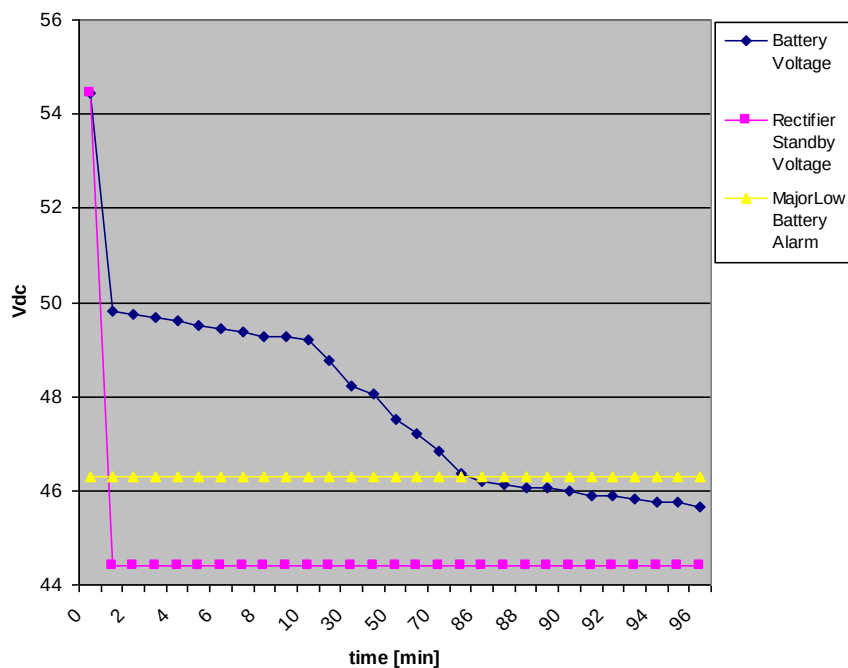
- Click the **“Apply”** button to **upload the Battery Table to the controller**
PowerSuite will then use the discharge performance data in the table

Battery Tests

The purpose of battery testing is to estimate the battery capacity, based on calculations on discharge tests and discharge data preconfigured in a battery definition table entered via *PowerSuite*. You find more information about the [“Battery Tables”](#) on page 308.

Read also the [“Discontinuance Battery Test”](#) on page 314, as it is a special battery test with a completely different testing purpose.

To evaluate the state of the battery bank, the controller starts a battery test by reducing the rectifiers’ output voltage so that the batteries take over the full load current.

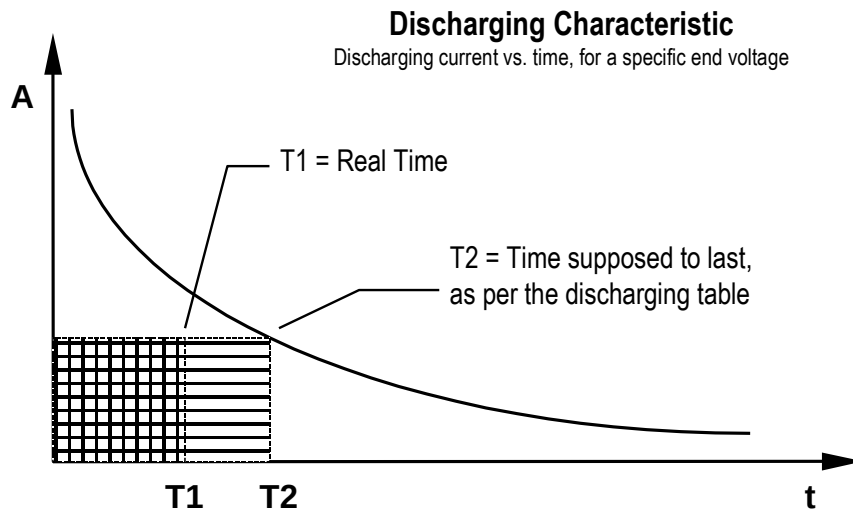


The batteries become then gradually discharged down to a specific End-of-Discharge Voltage, (“End Voltage (volt/cell)”).

Average current and test duration are measured and compared with the data on the battery definition table.

The battery capacity is calculated as the ratio between the actual test duration and the expected test duration with an average current, as specified in the battery definition table.

The controller evaluates then if the discharge duration is acceptable, and eventually raised a battery alarm.



PowerSuite implements 3 types of battery tests, and 3 different methods to initiate the tests.

Read more about the topic in the “Battery” dialog box, on the [Test tab](#) (page 110) in *PowerSuite Help*.

Types of Battery Tests

Via *PowerSuite*, the system controller implements 3 types of battery tests:

- Simplified Battery Test
- Normal Battery Test
- Discontinuance Battery Test

While two of them may be used to evaluate the battery bank’s capacity, the Discontinuance test is used to detect defect battery cells. Read also the [“Discontinuance Battery Test”](#) on page 314.

Simplified Battery Test

The Simplified Battery Test **does not use the battery definition table** as test reference in calculations, thus not being able to compute a reliable battery capacity.

The Simplified Battery Test may only indicate if the batteries are “good” or “bad”.

The test starts by reducing the rectifiers’ output voltage so that the batteries supply the load and get discharged until their *end-of-discharge voltage* is reached (“End Voltage (volt/cell)”).

The test is automatically stopped before the battery voltage drops to *end-voltage*, if the batteries are discharged for a longer period of time than (“Max Duration (minutes)”) OR if a maximum amount of energy is discharged from the batteries (“Max Discharge (Ah)”).

The following three parameters for test termination criteria are user-editable, but they should be within the range specified in the battery definition table:

- “End Voltage (volt/cell)”, user-editable
- “Max Duration (minutes)”, user-editable
- “Max Discharge (Ah)”, user-editable

NOTICE: The batteries are “**good**” if the test is automatically stopped due to the test duration has reached the (“Max Duration (minutes)”)

limit OR the (“Max Discharge (Ah)”) limit, before the (“End Voltage (volt/cell)”) limit. Otherwise, the batteries are “**bad**”.

Read more about the topic in the “Battery” dialog box, on the [Test tab](#) (page 110) in *PowerSuite Help*.

Normal Battery Test

The Normal Battery Test **uses the battery definition table** as test reference for calculations.

The test starts by reducing the rectifiers’ output voltage so that the batteries supply the load and get discharged until their *end-of-discharge voltage* is reached (“End Voltage (volt/cell)”).

The test is automatically stopped before the battery voltage drops to *end-voltage*, if the batteries are discharged for a longer period of time than (“Max Duration (minutes)”).

The following three parameters for test termination criteria are:

- “End Voltage (volt/cell)”, specified in the definition table
- “Max Duration (minutes)”, user-editable

NOTICE: A valid battery **test result is only evaluated when the battery test has terminated due to the batteries being discharged to the end-of-discharge voltage.**

Tests terminated due to elapsed maximum test duration or manually aborted will be discarded.

Read more about the topic in the “Battery” dialog box, on the [Test tab](#) (page 110) in *PowerSuite Help*.

Discontinuance Battery Test

Read the “[Discontinuance Battery Test](#)” on page 314.

Battery Test Start Methods

Via *PowerSuite*, the system controller implements 3 different methods to initiate battery tests:

1. Manual Start Method
2. Interval Start Method
3. Automatic Start Method

Note that a fourth method -- the Discontinuance Start Method -- is only used to enable and initiate Discontinuance Battery Tests.

Read also the “[Discontinuance Battery Test](#)” on page 314, as it is a special battery test with a completely different testing purpose.

“Guard Time” or Start Delay

This *PowerSuite* battery test parameter may be used to avoid initiating a battery test right after an AC mains supply outage, when the battery bank might be discharged.

Regardless of the start method you select, you can configure how many hours, after the last AC mains outage, a battery test initiation shall be delayed. You can configure the “Guard Time” with a maximum of 1000 hours or 41.6 days

NOTICE: In power systems with frequent AC mains outages and long “Guard Time” value, e.g 336 hours (14 days), the “Guard Time” may inhibit all battery tests.

Read more about the topic in the “Battery” dialog box, on the [Test tab](#) (page 110) in *PowerSuite Help*.

1. Manual Start Method

You may start and stop the battery tests manually, by using the “**Start Test**” and “**Stop Test**” buttons in the “Battery” dialog box, on the [Test tab](#) (page 110) in *PowerSuite Help*, or via the Smartpack controller’s front panel.

PowerSuite might notify you that the power system is busy, or that the battery test may not be initiated at the moment.

2. Interval Start Method

You may schedule to start a battery test automatically at a specified date and time, and repeat the test at a specified intervening period of time.

Also, you can exclude the Interval Test during from one to 3 months every year. Interval battery tests due to start during these months will be inhibit.

For instance, you could schedule *PowerSuite* to initiate a battery test May the 19th 2007, at 08:00 hours and repeat the battery test every 180 days at the same time. Battery tests due to start during June, July and August are to be inhibit.

NOTICE:
The Interval Battery Test will not start, if any of the following alarm monitors are in alarm status, caused by a Major Alarm event:

- **RectifierError**
- **RectComm_Error**
- **BatteryQuality** (indicates the result of a battery test)
- **DeltaStringCurr** (indicates the result of a discontinuance test. Requires installation of shunts in all battery strings)
- **SymmVolt X.X** (indicates the result of symmetry measurements)

3. Automatic Start Method

A battery test may be initiated automatically when an AC mains supply outage has occurred.

If the mains outage lasts long enough for the batteries to get discharged until their *end-of-discharge voltage* is reached (“End Voltage (volt/cell)”), the battery test is evaluated and logged.

Discontinuance Start Method

The Discontinuance Start Method is only used to enable and initiate a Discontinuance Battery Test.

Read also the description of the “[Discontinuance Battery Test](#)” on page 314, as it is a special battery test with a completely different testing purpose.

You may schedule to start and stop a Discontinuance Battery Test automatically:

- At a specified date and time (specified in the “Interval Test” sub-tab)

- Make the test last a defined number of minutes (“Max. Duration (minutes)” between 1 and 10 minutes), (specified in the “Discontinuance Test” sub-tab)
- And repeat the test at a specified intervening period of time (“Repeat Frequency (days)” between 0 and 7 days), (specified in the “Discontinuance Test” sub-tab)

Discontinuance Battery Test

Discontinuance Battery Test is a testing and monitoring method for automatically detecting unbalanced battery strings.

This test is a special battery test with a completely different testing purpose; see topic “[Types of Battery Tests](#)” on page 311.

Open circuit battery strings and short-circuited cells are often caused by battery cell failures, which result in imbalance of the string voltage and current.

Though imbalance of battery string voltages are detected by traditional “[Battery Symmetry Measurements](#)” on page 296, it may take time for the fault to be observed, especially if the alarm limits are quite high.

On the other hand, imbalance of battery string currents is detected much earlier by the Discontinuance Battery Test.

NOTICE: Discontinuance Battery Test can be used in conjunction, or instead of battery symmetry monitoring.

Hardware Requirements

To use the Discontinuance Battery Test, the power system’s battery bank must be implemented with battery blocks with the same capacity, have at least 2 battery strings, and each string must have an individual shunt.

How Does It Function

In simple terms, the system controller monitors the individual battery string currents, and raises an alarm if one of the currents is a % of deviation away from the “average” or “arithmetic mean” string current.

The Discontinuance Battery Test totals the string currents, and computes an arithmetic mean string current value. Then, it calculates a percentage deviation against the individually measured string currents.

If the calculated % of deviation exceeds the “**DeltaStringCurr**” alarm monitor limit, the monitor will raise an alarm.

To avoid false alarms due to shunt tolerances, the test will not be evaluated (will not start) if the total battery current is less than 5% of the shunt value.

You find the “DeltaStringCurr” alarm monitor under the “Status” tab, in the [Battery dialog box](#) (page 105) topic, in *PowerSuite Help*.

Discontinuance Battery Test Calculations

This example illustrates the calculations involved in the Discontinuance Battery Test, while ignoring minor battery tolerance characteristics.

A 30A battery bank consists of 3 battery strings; each should deliver about 10A (the arithmetic mean string current). $[(10+10+10)/3]=10$

Due to battery cell failures, one of the string currents is measured to 5A, while the other two string currents are measured to 12.5A each. The arithmetic mean is still 10A $[(5+12.5+12.5)/3]=10$

Each string's % deviation from the mean value can now be calculated as:

The 5A string: $(5/10) * 100 = 50\%$ (50% lower value)

The 12.5A string: $(12.5/10) * 100 = 125\%$ (25% higher value)

If the "DeltaStringCurr" alarm monitor is configured with a 50% deviation limit from the arithmetic mean, then the monitor will raise an alarm on the 5A string.

Battery Boost Charging

Battery Boost Charging (Equalizing Charge) is used to reduce the required recharging time by increasing the charging voltage, e.g. between 2.23V/cell to 2.33V/cell.

You have **3 different methods to initiate** battery boost charging:

- **Manual start method**
Enables manually start and stop of battery boost charging. You need to enter a Max. Duration (maximum number of minutes the boost charging shall last, unless stopped manually)
- **Interval start method**
Enables to schedule the automatic start of battery boost charging at a specified date and time, and repeat the boost charging at a specified intervening period of time
- **Automatic start method**
Enables automatic start of battery boost charging, based on the degree of battery discharge after an AC mains supply outage or after a battery test

To configure and schedule a battery boost charging, you have to select or change:

- **Boost Charging Voltage**
- Boost Alarm Group
- Boost **starting method** and parameter

Temperature Compensated Charging

Due to a battery's electrochemical characteristics, a fixed charging voltage can provide optimum charging only at a fixed battery temperature. Under actual operating conditions, the battery temperature will vary due to the charge and discharge cycle, ambient temperature fluctuations, etc.

Read also "[Effect of Temperature on Charging Voltage](#)" on page 316.

During low battery temperature conditions, the batteries will never reach 100 % capacity with a fixed charging voltage. Likewise, during high temperature conditions the batteries will be overcharged, reducing their lifetime and increasing the risk of a catastrophic thermal runaway event.

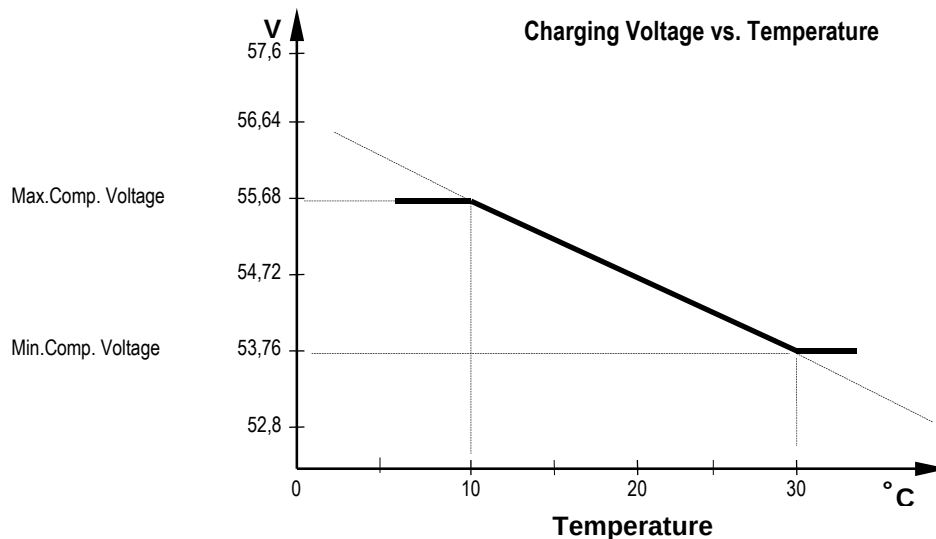
Read also "[Effect of Temperature on Battery Capacity](#)" on page 317.

To compensate for these thermal effects, the system controller can adjust the charging voltage proportional to the battery temperature.

Temperature Compensated Charging Equation

The Temperature Compensated Charging Equation can be represented by a straight line, based on the charging voltage at 20 °C and the desired variation of the charging voltage per degree Celsius.

See the following graph for a representation of the charging voltage versus temperature relationship for a 48V battery bank.



The following two parameters are specified by the battery manufacturer:

- **Reference Voltage (V/Cell)**
The charging voltage per battery cell, at a reference temperature of for instance 20°C, as recommended by the battery manufacturer
- **Temperature Slope (mV/°C/Cell)**
The slope of the Temperature Compensated Charging Equation is expressed as the change in millivolts per battery cell per degree Centigrade (the recommended compensation factor for the type of batteries)

In order to protect connected load equipment against too high and too low output voltage, it also is advisable to specify the following parameters:

- **Min Compensation Voltage (V/Cell)**
Minimum charging voltage per battery cell
- **Max Compensation Voltage (V/Cell)**
Maximum charging voltage per battery cell

Effect of Temperature on Charging Voltage

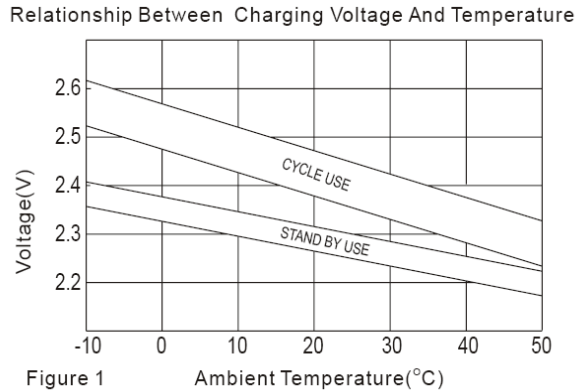
As temperature rises, electrochemical activity in a battery increases. Similarly, as temperature falls, electrochemical activity decreases.

Therefore, conversely, as temperature rises, charging voltage should be reduced to prevent overcharge, and increased as temperature falls to avoid undercharge.

NOTICE: In general, to assure optimum service life, temperature compensated charging is recommended.

The recommended compensation factor for a type of batteries could be - 3mV/°C/Cell (stand by) and -5mV/°C/Cell (cyclic use).

The figure below shows the relationship between temperatures and charging voltages in both cyclic and standby applications. The standard center point for temperature compensation is 25°C.



Effect of Temperature on Battery Capacity

Optimum battery life will be achieved when the battery is operating between 20°C and 25°C.

The nominal battery capacity is based on the temperature of 25°C. Above this temperature, the capacity increases marginally, but the working battery should be kept within the temperature design limitations of the product.

Below 25°C, the capacity decreases. This decrease in capacity becomes more prominent at temperatures below 0°C and in heavy discharge rates.

NOTICE: Temperature must be taken into capacity design calculations in applications where the operating temperature of the system is below 20°C.

The chart below illustrates the situation and the decrease in capacity with the decrease in operating temperature.

Discharge time	Battery temperature											
	-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C
10min	0.46	0.52	0.58	0.65	0.71	0.78	0.85	0.93	1	1.07	1.15	1.22
1 hour	0.59	0.64	0.69	0.74	0.80	0.85	0.90	0.95	1	1.05	1.09	1.14
10hour	0.71	0.75	0.79	0.82	0.86	0.90	0.93	0.97	1	1.03	1.06	1.08

Battery Charging Current Limitation

This function is used to avoid too high charging current to the battery bank, in cases where the system load is small, while the batteries are deep discharged.

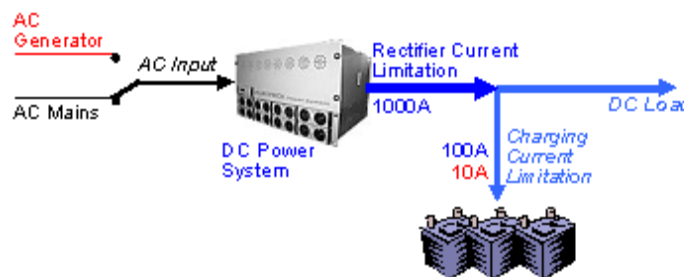
Read also “[Excessive Battery Charging and Discharging](#)” on page 318.

Too high charging current creates excessive heat, and may damage the batteries. When feeding the power system from AC generators instead of the AC mains grid, the Current Limitation value may be set lower than with the AC mains grid. This could be useful when feeding with under-dimensioned gen-sets, then prioritizing the DC load over the recharging time.

NOTICE: As opposed to the Battery Charging Current Limitation -- the Rectifier Current Limitation reduces the total current output, thus affecting both the batteries and the load.

Read also topic “[Rectifiers Current Limitation](#)” on page 286.

Using the Battery Charging Current Limitation function you may charge the battery bank while protecting from overcharging.



NOTICE: The Efficiency Manager function may not be used together with Battery Charging Current Limitation, if the Smartpack controller's firmware is older than version 2.03

The Battery Charging Current Limitation is accomplished by a regulation loop, where the controller adjusts the rectifiers' output voltage to a value just above the measured battery voltage. The controller then reads the battery current and checks that it is lower than the Battery Charging Current Limitation's set point.

Excessive Battery Charging and Discharging

Excessive battery charging (overcharging) occurs when the total capacity removed has been replaced by recharging, and the battery remains on charge.

This overcharging creates excessive heat that can cause the battery plates within the cells to buckle and shed their active material. The battery will react to the overcharge by producing an excessive amount of hydrogen and oxygen. These gases are the result of the breakdown of the water molecules within the electrolyte. The water that has been displaced by overcharging can be replaced in a serviceable (non-sealed) battery, but, in the maintenance-free sealed batteries, permanent capacity loss will result.

In general, the charging current depends on the type of batteries, and is typically 10-20% of the battery banks capacity. E.g. for 100Ah battery banks: 10-20A; for 500Ah battery banks: 50-100A.

Excessive battery discharging can cause damage to a battery. The amount of discharge a battery can have without damage depends upon its chemistry.

In general, a lead acid battery will not tolerate as deep a discharge as a NiCad or NiMh battery. Sealed lead acid batteries function best if they are discharged to only about 85% of nominal voltage (10.2V on 12V battery).

Battery Temperature Levels ~ “BatteryLifeTime” monitor

The system controller can monitor how many hours the system’s battery bank has been within a user-defined temperature range. Ten different ranges may be monitored. For each of them, you can configure the upper and lower temperature values.

The “BatteryLifeTime” alarm monitor -- see under the “Status” tab, in the [Battery dialog box](#) (page 105) topic, in *PowerSuite Help* -- monitors the parameters in the table in the [Temperature Monitor tab](#) (page 121) in *PowerSuite Help*, and calculates the total number of days the battery bank has been within the specified ranges.

The monitor can be configured to activate a Major and a Minor alarm when the number of days exceeds a certain period of time.

Event	Day(s)	Alarm group
Major alarm	100	Major alarm
Minor alarm	60	Minor alarm

“BatteryLifeTime” Monitor Calculations

The “BatteryLifeTime” alarm monitor computes the total number of days the battery bank has been within the specified ranges, by:

- Calculating the weighted number of hours for each range (number of hours multiplied by the weight number or factor).
- Adding up all the ten ranges’ weighted number of hours
- Dividing the total by 24, to find the total number of days.

The “Temperature Monitor” table

Range #	Temperature Range		Weight	Time within Range
	Low Limit, °C	High Limit, °C		Hours
01	00	10	1	96
02	11	20	1	20
03	21	30	2	360

	Temperature Range			Time within Range
04	31	40	2	130
05	41	50	3	120
06	51	60	3	00
07	61	65	4	00
08	66	70	6	00
09	71	75	12	00
10	76	99	64	00

In the example ranges displayed in the table, the calculations of the “BatteryLifeTime” alarm monitor will be:

Range	Calculation	Total (h)
01	1x96	96
02	1x20	20
03	2x360	720
04	2x130	260
05	3x120	360
	Total	1456

“BatteryLifeTime” = 1456 hours / 24 = 60.7 days

In the example, the “BatteryLifeTime” alarm monitor will raise a minor alarm, as it is configured to do so when the monitor’s counter reaches 60 days.

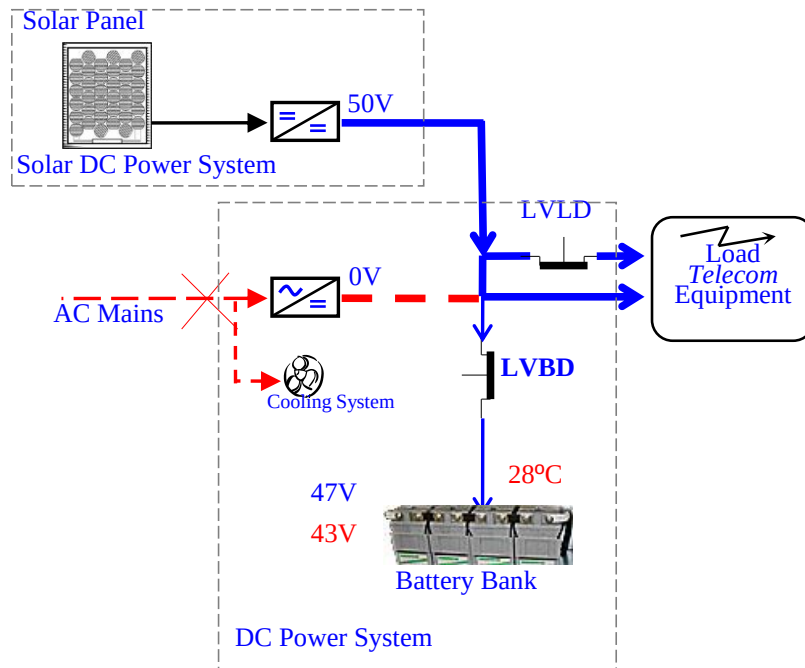
You can reset the values in the Battery Lifetime Temperature monitor either by selecting “ServiceOption > BattLifeTime Rst”, via the controller’s front keys, or using other GUI.

LVBD - Battery Protection

To protect the power system’s battery bank during a critical condition or when the battery temperature is too high, the system’s controller disconnects and reconnects the battery bank from the load using the LVBD contactor.

The example in the figure shows a fan cooled DC power system with Mains failure, using a solar system as an additional primary supply.

For information about the example’s voltage limits and criteria, read the topic “[Typical Parameters for Alarm Monitors](#)” on page 326 or the [LVBD dialog box](#) (page 134) topic, in *PowerSuite Help*



In the example, the system's controller **trips the LVBD contactor** (disconnects the battery bank from the load) when all the following conditions are met:

- The AC Mains supply fails (critical condition)
- The battery voltage has dropped down to e.g. 43V (Disconnect Voltage)

In the example, the system's controller **reconnects the LVBD contactor** when all the following conditions are met:

- A. The AC Mains supply is ON again (Normal Condition and **Mains Dependent**)
- B. The LVBD contactor has been disconnected longer than the **Delay After Disconnect** period of time
- C. The rectifier system output voltage has risen to e.g. 47V (**Reconnect Voltage**)
- D. The battery temperature is lower than e.g. 28°C (the temperature limit configured in the "BatteryTemp" alarm monitor) (**Temperature Dependent**)

NOTICE: In this example -- while the Mains supply is OFF -- an additional solar system may recharge the battery bank. The LVBD contactor will NOT be reconnected because the Mains supply is still OFF (**condition A**). In this situation, the controller may reconnect the LVBD contactor, if you **check the "Mains Independent" option**, which you find in the [LVBD dialog box](#) (page 134) in *PowerSuite Help*.

NOTICE: In this example, the fan cooled system stopped due to the Mains outage, which caused a battery temperature increase above 28°C. The LVBD contactor will NOT be reconnected because the battery temperature is not lower than 28°C (**condition D**). In this situation, the controller may reconnect the LVBD contactor, if

you **uncheck** the “**Temperature Dependent**” option, which you find in the [LVBD dialog box](#) (page 134) in *PowerSuite Help*.

Control System Functions

This section clarifies the functionality of the control system – which consists of controllers and other type of control units.

Access Levels

The control system protects system parameters and other configured values with following three different access levels:

- **User Access Level**
is the default level when you access the menus or GUI.
Log in is not required.
You can read all parameters and values (Read Access), but changing them is not allowed.
- **Service Access Level**
By logging in to this level you can change most of the system parameters and values (Write Access).

The default Pin-Code or password is <0003>.

We strongly recommend changing this password as soon as the power system is installed.
Notice that factory parameters may not be changed (Read Access).

- **Factory Access Level**
As the name indicates, only *Eltek* personnel will have access to change certain critical values, such as LVD settings, etc.

You can use the controller's keypad or other GUI to change the access level password.

E.g. to do this in PowerSuite, read the "[Access Levels](#) (page 19)" topic in *PowerSuite Help*.

WARNING:

If you change and forget the control system's default password, you will need a Master Password to reset all passwords to default.

Master Password – Reset All Passwords

We strongly recommend changing the control system's password as soon as the power system is installed, and keep the new password in a safe place.

If you forget the new password, you will not be able to configure your power system.

Follow this procedure to reset all passwords to default:

1. **Send the Serial Number** of your power system's controller by e-mail to the *Eltek Service Department*

E.g. to find the serial number using PowerSuite, read the "[Control Unit Summary tab](#) (page 146)" topic in *PowerSuite Help*.

2. *Eltek Service Department* will **send you a Master Password** code

- Using the controller's keypad or other GUI, **enter the Master Password** code, and **reset all passwords** to default

E.g. to do this in PowerSuite, read the "[Change Password - Advanced tab](#) (page 30)" topic in *PowerSuite Help*.

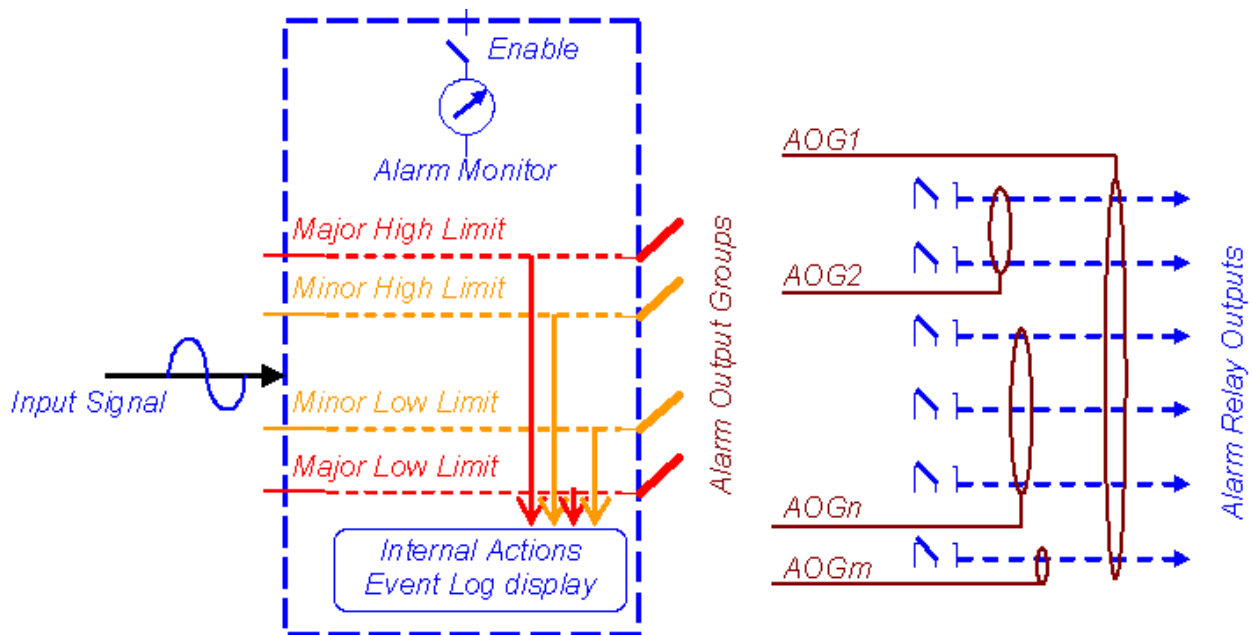
Alarm Monitors

Alarm monitors are software modules used by the system controller to **measure system internal and external input signals or logical states**.

When an alarm monitor is enabled, it **compares the measured parameter with pre-programmed values or limits**, and raises an alarm in the event of the measured parameter reaching one of the limits.

When this event occurs, the alarm monitor stores the event in the Event Log, initiates an internal action and activates an output group.

Internal pre-programmed actions may be battery current limiting, boost inhibiting or similar. The generated alarm **activates a pre-programmed group of relay outputs** (an alarm output group, AOG).



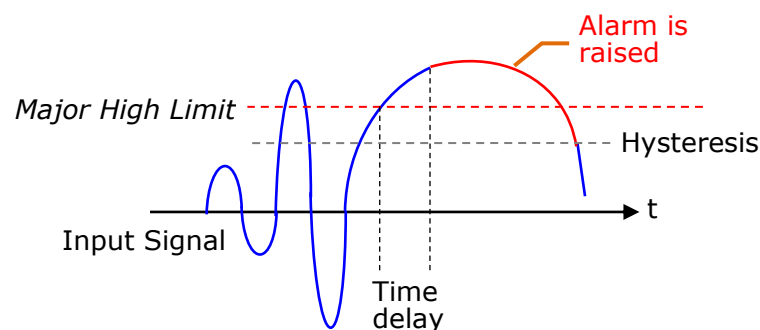
The alarm monitors' most commonly used configuration parameters are: (Refer to the "[Alarm Monitor dialog boxes](#) (page 163)" topic in *PowerSuite Help*)

- Type of input**
 The measured Input Signal can be *analogue* (e.g. a voltage), *logical* (e.g. an open or close contact) and *numeric* (e.g. number of rectifiers, % remaining capacity, etc.)
- Alarm Monitor activation**
 You have to *Enable* the alarm monitor so that it functions
- Type of alarm reset**
 You can select whether the alarm generated by monitor can be *reset manually*, or automatically (when the event that caused the alarm is no longer true)

- **Hysteresis and Time delay**

When the input signal has reached a certain limit or criteria for a *certain period of time*, the alarm monitor raises an alarm. This period of time is called *Time delay*.

You can also enter a *hysteresis* value to prevent the alarm monitor from unwanted rapid “switching”, when the input signal is around the limit or criteria.



For example: A *MajorHigh* Limit is set to 57.00VDC, with a Hysteresis of 0.10VDC and a Time delay of 5 seconds.

An input signal of 57.08VDC lasting 3 seconds will not cause the alarm monitor to raise an alarm.

The alarm will only be generated when the input signal is over 57.00VDC for a longer period of time than 5 seconds (the *Time delay*).

The alarm will only be switched off when the input signal is lower than 56.90VDC (the *hysteresis*).

- **Monitored Limits and Events**

Analogue and numeric alarm monitors compare the measured input with from one to four user-defined values or limits; two above normal value (*Major High* and *Minor High*) and two below normal value (*Minor Low* and *Major Low*). The type and number of internal actions (*events*) are usually defined from factory.

Logical alarm monitors only compare the measured input signal with a logical state (normally open or close). The user can define the alarm group that the monitor will activate when the input signal is not in the normal state.

- **Alarm output groups**

For each value or limit, you can select which alarm output group (AOG) the alarm monitor will activate in the event the measured input reaches the specific limit

- **Measured Average Value**

The alarm monitor stores all input signal measurements and performs average calculations every minute. Then, the monitor continuously displays the *input signal average value*, and the period of time the input signal has been measured. You can restart the monitor’s average calculations.

- **Measured Peak Value**

The alarm monitor stores all input signal measurements. Then, the monitor continuously displays the *input signal peak value*, since the measurements started. You can restart the monitor’s peak value measurements.

In addition, you can configure the alarm monitors with a description of the alarm monitor and other configuration parameters.

Read also the “[Alarm Monitor dialog boxes](#) (page 163)” topic in *PowerSuite Help*.

Types of Alarm Monitors

The power system's controller uses following types of alarm monitors, determined by the monitor's type of input signal:

- **Logical Alarm Monitors (L1)**
(monitor logical states such as Open/Close or Yes/No)
- **Numeric Alarm Monitors (N1, N2%)**
(monitor numeric values such as the number of rectifiers, errors, the % battery capacity, etc)
- **Analogue Alarm Monitors (A2, A4)**
(monitor analogue values such as voltage, current, etc)
- **Special Alarm Monitors (LVD)**
(monitor the battery voltage and controls the LVD contactors)

Analogue and numerical alarm monitors compare the measured input with from *one to four user-defined values or limits*; two above normal value (*Major High* and *Minor High*) and two below normal value (*Minor Low* and *Major Low*).

Logical alarm monitors only compare the measured input signal with a logical state (normally open or close). The user can define the type of event the monitor activates when the input signal is not in the normal state.

Using *PowerSuite*, you can change the default alarm monitor's name (Description). This is useful for alarm monitors of the type "ProgInput X.Y", but you should be careful changing the name of other system alarm monitors.

Read also the "[Alarm Monitor dialog boxes](#) (page 163)" topic in *PowerSuite Help*.

Typical Parameters for Alarm Monitors

The power system's controller uses following types of alarm monitors, determined by the monitor's type of input signal:

- *Logical Alarm Monitors (L1)*
- *Numeric Alarm Monitors (N1, N2%)*
- *Analogue Alarm Monitors (A2, A4)*
- *Special Alarm Monitors (LVD)*

The examples below show typical configuration parameters for these alarm monitors.

Parameters for Logical Alarm Monitors (L1)

Example to monitor logical states such as Open/Close or Yes/No.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or "All Levels" or "MajorHigh Only" (a)
	Hysteresis	000		(not applicable)
	TimeDelay	7	Seconds	Selects among delay time options (b)
	MinorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate

Parameters for Numerical Alarm Monitors (N1)

Example to monitor numeric values such as the number of rectifiers, errors, etc.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or "All Levels" or "MajorHigh Only" (a)
	Hysteresis	0000	Units	(not applicable)

#	Description	Value	Unit/Label	Note
	TimeDelay	2	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	001	Units	Upper limit
	MajorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	001	Units	Lower limit
	MinorHigh AlarmGroup	Minor Alarm		Selects the alarm group to activate

Parameters for Numerical Alarm Monitors (N2%)

Another example to monitor numeric values such as the percent of battery capacity, etc.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or “All Levels” or “MajorHigh Only” (a)
	Hysteresis	2	%	(b)
	TimeDelay	10	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	95	%	Upper limit
	MajorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	80	%	Lower limit
	MinorHigh AlarmGroup	Minor Alarm		Selects the alarm group to activate

Parameters for Analogue Alarm Monitors (A2)

Example to monitor analogue values such as voltage, current, etc with 2 limits.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or “All Levels” or “MajorHigh Only” (a)
	Hysteresis	100	Amp	(b)
	TimeDelay	5	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	5000	Amp	Upper limit
	MajorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	4000	Amp	Lower limit
	MinorHigh AlarmGroup	Minor Alarm		Selects the alarm group to activate

Parameters for Analogue Alarm Monitors (A4)

Example to monitor analogue values such as voltage, current, etc with 4 limits.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or “All Levels” or “MajorHigh Only” (a)
	Hysteresis	10	Volt AC	(b)
	TimeDelay	7	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	280	Volt AC	Major High upper limit
	MajorHigh AlarmGroup	Mains Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	260	Volt AC	Minor High upper limit
	MinorHigh AlarmGroup	Mains Alarm		Selects the alarm group to activate
	MinorLow AlarmLevel	100	Volt AC	Minor Low lower limit
	MinorLow AlarmGroup	Mains Alarm		Selects the alarm group to activate
	MajorLow AlarmLevel	80	Volt AC	Major Low lower limit
	MajorLow AlarmGroup	Mains Alarm		Selects the alarm group to activate

Parameters for Special Alarm Monitors (LVD)

Example to monitor the battery voltage and control the LVD contactors.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	MainsIndependent Enable/Disable?	☐	Enable	(c)
	Temp. Dependant Enable/Disable?	☐	Enable	(d)
	Disconnect Voltage [V]	43,00		(e)
	Reconnect Voltage [V]	18,00		(f)

#	Description	Value	Unit/Label	Note
	Delay After Disconnect [seconds]	000		Selects among delay time options (g)
	AlarmGroup	LVBD		
				Selects the alarm group to activate
				Minor Low lower limit
				Selects the alarm group to activate
				Major Low lower limit
				Selects the alarm group to activate

The LVD alarm monitors “observe” that the battery voltage (input signal) is within limits, otherwise they activate the LVD contactors (alarm group).

(a) **Manual Reset**

Read also topic “[Alarm Reset](#)” on page 242

(b) **Hysteresis and Time Delay**

Read also topic “[Alarm Monitors](#)” on page 324

(c) **Mains Independent**

Check this option if you want that the LVD alarm monitor will reconnect the LVD contactor when the rectifier system output voltage reaches the Reconnect Voltage limit, regardless whether Mains is ON or OFF. For example, this is possible using an additional primary supply.

Uncheck this option (Mains dependent) if you want that the LVD alarm monitor will NOT reconnect the LVD contactor until Mains is ON again.

(d) **Temperature Dependent**

Used with LVD contactors that disconnect the battery bank (LVBD). Check this option if you want that the LVD alarm monitor will reconnect the LVBD contactor when the battery temperature is lower than the temperature limit configured in the “BatteryTemp” alarm monitor.

(e) **Disconnect Voltage**

Enter a numeric value for the battery voltage drop-down limit. When -- after a Mains failure -- the battery voltage gradually drops down to this limit; then the alarm monitor raises the alarm and trips the LVD contactor.

(f) **Reconnect Voltage**

Enter a numeric value for the battery voltage reconnection limit. When the Mains supply is ON again, the rectifier system output voltage increases to this limit; then the alarm monitor will reconnect the LVD contactor.

(g) **Delay Time after Disconnect**

Enter the Time delay or number of seconds the LVD contactor has to be tripped or disconnected, before the alarm monitor is allowed to reconnect the LVD contactor

Alarm Output Groups

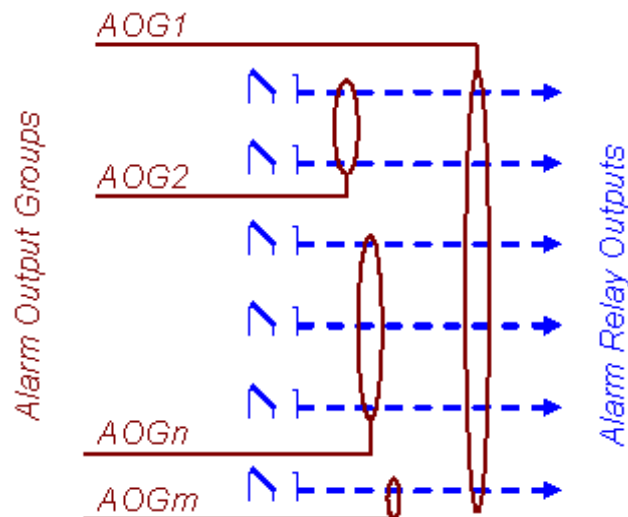
An Alarm Output Group (AOG) is a **user defined software assignment** that consists of grouping together all the **outputs** that **always are activated at the same time**.

The outputs -- alarm relay outputs and or latching contactors (LVLD and LVBD) – are distributed among the power system’s controllers and control units.

Read also the topic “[System Inputs and Outputs - Overview](#)” on page 349, for an overview of all the power system’s outputs.

In order to activate the alarm relay outputs and latching contactors (LVLD and LVBD) in the DC power supply system, **you have to assign them to output groups (AOG)**.

Output relay assignment and output relay mapping are similar terms, synonyms.



Read also the “[Alarms Overview Outputs tab](#) (page 59)” topic in *PowerSuite Help*.

The DC power supply system uses at least **20 different alarm output groups** (AOG); 18 for assignment of alarm output relays, and 2 or more for assignment of LVD latching contactors.

Usually, the **first seven** alarm output groups have alarm relay outputs already assigned to them from factory (**Factory Default Settings**).

Typically, alarm output groups 8 through 18 are listed as “*Alarm Group 8*”, “*Alarm Group 9*”... to “*Alarm Group 18*”, but they have no alarm relay outputs assigned.

Alarm output groups “LVBD OG” and “LVLD1 OG” have usually LVD battery and load latching contactors assigned from factory.

NOTICE: Usually, most controllers and I/O Monitors are physically equipped with relay outputs.

The outputs of *Smartnode* control units are telephone numbers, instead of relay outputs.

The assignment procedure is the same, but you group the phone numbers and assign them to Alarm Output Group.

Read also topic “[Control Unit Modem Callback Setup tab](#) (page 155)” in *PowerSuite Help*.

The example below shows typical Alarm Output Group assignment in a *Smartpack2*-based system. The *Smartpack2 Basic* controller is equipped with the 3 LVD contactors, and the *I/O Monitor2* control unit with the 6 relay outputs.

Alarm Configuration > Outputs

#	Description Alarm Groups	Output	1	2	3	4	5	6	LVBD	LVLD1	LVLD2	Note
1	Major Alarm, AOG		☒	☐	☐	☐	☐	☐				
2	Minor Alarm, AOG		☒	☐	☐	☐	☐	☐				
3	Mains Alarm, AOG		☒	☒	☐	☐	☐	☐				
4	Fuse Alarm, AOG		☒	☐	☒	☐	☐	☐				
5	High Battery Alarm, AOG		☒	☐	☐	☒	☐	☐				

#	Description	Output	1	2	3	4	5	6	LVBD	LVLD1	LVLD2	Note
Alarm Groups												
6	Low Battery Alarm, AOG		☒	☐	☐	☐	☒	☐				
7	Rectifier Alarm, AOG		☒	☐	☐	☐	☐	☒				
8	Gen-Set AOG		☒	☒	☐	☐	☐	☐				
9	Alarm Group 9		☐	☐	☐	☐	☐	☐				
10	Alarm Group 10		☐	☐	☐	☐	☐	☐				
---			☐	☐	☐	☐	☐	☐				
---			☐	☐	☐	☐	☐	☐				
17	Alarm Group 17		☐	☐	☐	☐	☐	☐				
18	OutpBlocked, AOG		☐	☐	☐	☐	☐	☐				
19	LVBD, AOG		☐	☐	☐	☐	☐	☐	☒			
20	LVLD, AOG 1		☐	☐	☐	☐	☐	☐		☒		
21	LVLD, AOG 2		☐	☐	☐	☐	☐	☐			☒	
----			☐	☐	☐	☐	☐	☐				
----			☐	☐	☐	☐	☐	☐				

In the example above,

- Alarm relay output 1 is used for external common alarm signaling
- Alarm Output Group 18, “OutpBlocked, AOG”
If an external warning is necessary, you can assign output relays to the “OutpBlocked, AOG” group, e.g. to activate a lamp or alarm bell when the alarm output relays are blocked.
Read more in topic “[Alarm Outputs Isolation \(Outputs Blocked\)](#)” on page 331
- Alarm Groups 9 through 17 are unused, and can be assigned when required

Output Test Commands

This logical subgroup lets you issue or activate **specific commands to test the activation of the alarm output relay contacts**. For example, following commands might be available in *Smartpack2 Master Controller*’s submenu:

Commands > **Output Test**

#	Description	Action	Unit/Label	Note
	Output Relay # 1	☐	No	Tests alarm relay number 1
	Output Relay # 2	☐	No	
	Output Relay # 3	☐	No	
	Output Relay # 4			
	Output Relay # 5			
	Output Relay # 6			

The Output Test functionality enables to test and verify the circuits connecting external equipment to the power system’s alarm relay outputs.

The Output Test command will toggle the alarm relay contacts -- regardless of the position they are at the moment -- for a certain period of time (entered in the “Output Test Timeout (sec)” in *PowerSuite*).

Issuing **commands is allowed** using a Pin-Code.

NOTICE:
The default Service Access Level password or Pin-Code is <0003>. We strongly recommend changing the passwords as soon as the power system is installed.

Alarm Outputs Isolation (Outputs Blocked)

When the user activates the “OutpBlocked” command, possible system **alarms will NOT trigger any** of the user defined **alarm output groups**, except for the “OutpBlocked, AOG” group (usually Alarm Output Group 18). This function implements a sort of relay isolation feature.

NOTICE:

The LVD contactors are not affected by the “OutpBlocked” command. Also, this command will reset possible active alarm relay outputs to their normal status.

The “OutpBlocked” command uses the Alarm Output Group 18 to facilitate external warning of this function being active (output relays activation is blocked).

If an external warning is necessary, you can assign output relays to the “**OutpBlocked, AOG**” alarm output group, e.g. to activate a lamp or alarm bell when the alarm output relays are blocked.

How to Activate the Outputs Blocked Feature

The “OutpBlocked” command can be activated from the *Smartpack*’s front panel keypad and from the computer-based GUI (*PowerSuite*, *SP2WebGUI*, etc.).

For **activation via the Smartpack’s front panel keypad**, refer to the menu options in the controller’s user guide, or to topic “[Smartpack Menu Options](#)” on page 356.

For **activation via PowerSuite**, you must **configure an spare programmable input** (alarm monitor) to implement the “OutpBlocked” feature.

E.g. if “ProgInput 1.1” is not used, enable and configure it by selecting the event “Block Outputs”. Then, if an external warning is necessary, select the “OutpBlocked, AOG” group, and save the configuration. Finally, assign output relays to the “OutpBlocked, AOG” group.

In the Tutorials section, you find more detailed information, in step 3 of the topic “[How to Configure Alarm Monitors & Programmable Inputs](#)” on page 368, and in topic “[How to Configure Alarm Output Groups](#)” on page 367.

How the Outputs Blocked Feature is Indicated

When the “OutpBlocked” command is activated, it will be indicated by:

- The *Smartpack*’s front panel display shows a text that indicates that the feature is activated
- The *Smartpack2 Master* controller’s System Status will display that the feature is activated. Refer to topic “[System Status options](#)” on page 182
- The *PowerSuite* GUI will display that the feature is activated, by the text in the Status field, in the configured programmable input

Firmware Upgrade

To upgrade the firmware of controllers and LAN devices you have to use a **specific program** to upload the correct **firmware file** to the controller or device (target).

NOTICE:

Contact the *Eltek* Service Dep. if you need to upgrade the rectifier's firmware or any CAN Bus control units other than controllers.

Which Program to Use for Upgrading

The **specific program** to use for firmware upgrading depends on the controller or LAN device you want to upgrade, as described below.

You can upgrade the firmware of following controllers: *Smartpack2 Master*, *Smartpack2 Basic*, *Smartpack* and *Compack*.

For Smartpack2 Master Controllers

To upgrade the firmware of **Smartpack2 Master controllers** you can use the "**Eltek Network Utility**" program (EVIPSetup.exe) or an SD card.

Read topics

"[Firmware Upgrade – Smartpack2 Controllers](#)" on page 333

and

"[Firmware Upgrade – Controllers with Ethernet Port](#)" on page 337.

For Smartpack2 Basic Controllers

To upgrade the firmware of **Smartpack2 Basic controllers** you can use the "**FWLoader**" program or an SD card.

Read topic

"[Firmware Upgrade – Smartpack2 Controllers](#)" on page 333.

For Smartpack Controllers

To upgrade the firmware of the **Smartpack controller**, you must use the "**FWLoader**" program.

Read topic

"[Firmware Upgrade - Smartpack Controller](#)" on page 335

For LAN Devices

To upgrade the firmware of **LAN devices**, you must use the "**Eltek Network Utility**" program (EVIPSetup.exe).

Following LAN devices' firmware can be upgraded:

- The **Smartpack2 Master** and **Compack controller**
Read topic:
"[Firmware Upgrade – Controllers with Ethernet Port](#)" on page 337.
- The **Smartpack controller's embedded Web Adapter**
Read topic:
"[Firmware Upgrade - Smartpack's Embedded Web Adapter](#)" on page 339
- The stand-alone **WebPower Adapter**
Read topic:
"[Firmware Upgrade – Stand-alone WebPower Adapter](#)" on page 339

To get acquainted with available LAN devices and corresponding firmware files, you can read the topics:

["Firmware Files and LAN Devices"](#) on page 340, and

["Content of WebPower Firmware ZIP File"](#) on page 344.

Firmware Upgrade – Smartpack2 Controllers

Upgrade of the **Smartpack2 Master** Controller's firmware, while the system is live, is performed either via the Ethernet port -- using the "**Eltek Network Utility**" program (EVIPSetup.exe) -- or via an SD card.

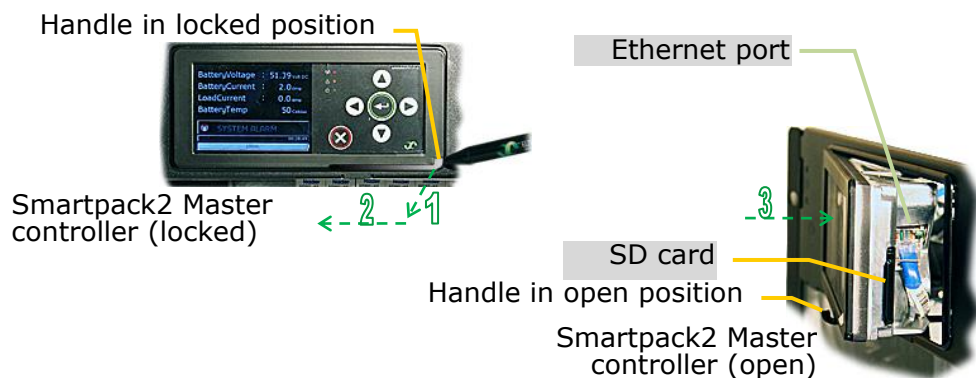
Upgrade of the **Smartpack2 Basic** Controller's firmware, while the system is live, is performed via the power system's CAN bus – using the "**FWLoader**" program -- or via an SD card.

Upgrading the firmware does not delete or change any of the configuration and calibration values stored in the *Smartpack2* controllers.

You can upgrade the *Smartpack2* Controller's firmware using one of the following two methods.

Firmware Upgrade from the SD Card

Both the **Smartpack2 Master** and the **Smartpack2 Basic** controllers' firmware can be upgraded via the SD card in the *Smartpack2 Master* controller.



NOTICE:

All firmware upgrade and configuration files stored in the SC card must have specific file names.

Do following:

1. **Open the controller**
using your fingers or a pen, see steps (1), (2) and (3)
2. **Insert an SD card**
containing the correct controller's firmware source file, e.g. <SP2MAST.BIN> for the *Smartpack2 Master* controller, or <SP2BAS.MHX> for the *Smartpack2 Basic* controller.

Read topic "[Overview Firmware Files \(SD Card - Binary Format\)](#)" on page 343

3. Select “**Up/Download > Software Upgrade**” via the *Smartpack2 Master*’s front keypad.

If the firmware file is < SP2MAST.BIN >, it will be automatically downloaded to the *Smartpack2 Master* controller.

If the firmware file is < SP2BAS.MHX >, then the controller will request to enter the *Smartpack2 Basic* controller’s CAN bus ID number, if several such controllers are connected the bus.

WARNING: Uploading the firmware may take a long time.

Firmware Upgrade from a Computer

The firmware for both the *Smartpack2 Master* and the *Smartpack2 Basic* controllers can be upgraded from a computer.

Smartpack2 Master Controllers

The *Smartpack2 Master* controllers’ firmware can be upgraded using a personal computer to run the “**Eltek Network Utility**” program (EVIPSetup.exe) to transfer the firmware file to the controller.

Do following:

1. **Connect a PC to the Smartpack2 Master controller** using a standard Ethernet cable.
To open the controller and access the controller’s Ethernet port, refer to the graphics in topic “[Firmware Upgrade from the SD Card](#)” on page 333
2. **Start** the “**Eltek Network Utility**” program (EVIPSetup.exe) in a the PC
3. **Select the Smartpack2 Master controller** (check correct MAC and IP address) **and the correct firmware file**
<SmartPack2_Master_nnnnnn.nnn_xx.xx_APP.s19>
4. Click on the “**Update Software**” button, in the EVNU program

You find more detailed information in topic “[Firmware Upgrade – Controllers with Ethernet Port](#)” on page 337.

Smartpack2 Basic Controllers

The *Smartpack2 Basic* controllers’ firmware can be upgraded using a personal computer to run the **FWLoader** program to transfer the firmware file to the controller.

Do following:

1. **Connect a PC — via an USB-to-CAN Converter** (art. 208565) — to one of the power system’s CAN bus ends, and move the end-of-line resistor to one of the converter’s CAN ports.
Refer to the connection schematics in the figure below.
2. **Start then the FWLoader** program on the PC
3. **Select “Smartpack2 Basic”** in the Target Selection
4. **Select “1”** in the Target Address
(the controller’s CAN bus ID number)

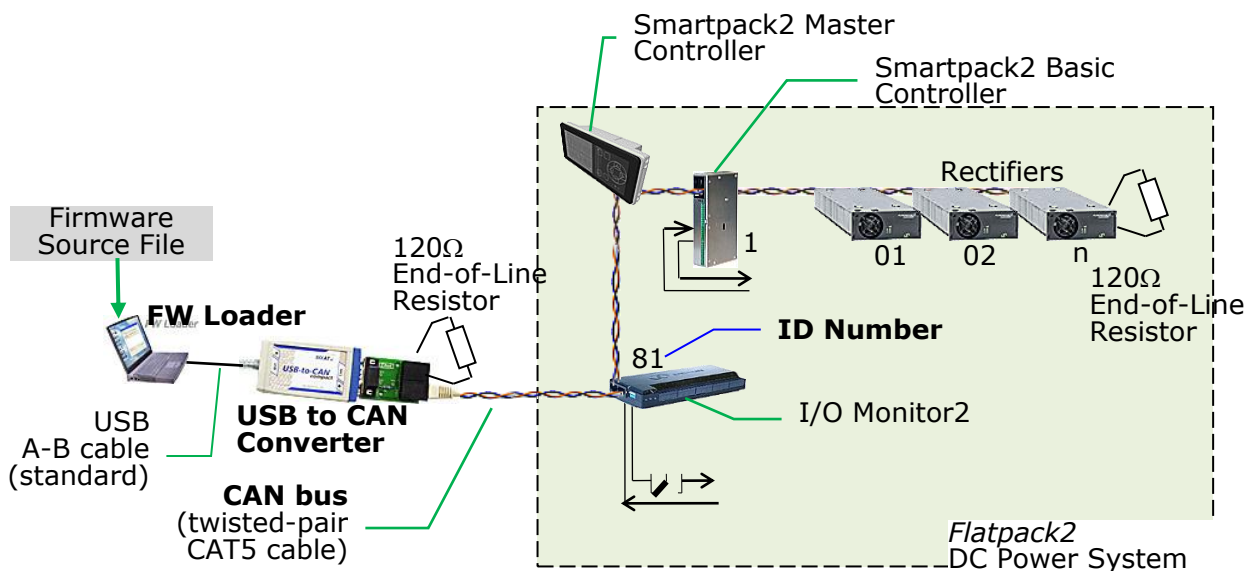
5. Select **“COMx”** in Communication Type (the communication port that the PC uses to communicate with the USB-to-CAN Converter)
6. Click on the “Open Source File” button and, **Select the file (*.MHX)** to upgrade the *Smartpack2 Basic* controller’s firmware with
7. Click on the **“Write to Target”** button

While the firmware is loaded to the *Smartpack2 Basic* controller, the *FWLoader* program displays a progress bar.

WARNING: Uploading the firmware may take up to 15 minutes.

Once the firmware has loaded, the *Smartpack2 Basic* controller will automatically restart.

You find a more detailed example in topic [“Firmware Upgrade - Smartpack Controller”](#) on page 335.



The example above shows a *Smartpack2*-based *Flatpack2* power system connected to a PC via a USB-to-CAN Converter (art. 208565). The *Smartpack2 Basic* controller’s CAN bus ID number is <1>.

Read more about the *FWLoader* program and other control units and CAN nodes in topic [“About the FWLoader Program”](#) on page 337.

Firmware Upgrade - Smartpack Controller

You can use the *FWLoader* program running on a PC to **upgrade the Smartpack controller’s firmware**. Read more [“About the FWLoader Program”](#) on page 337.

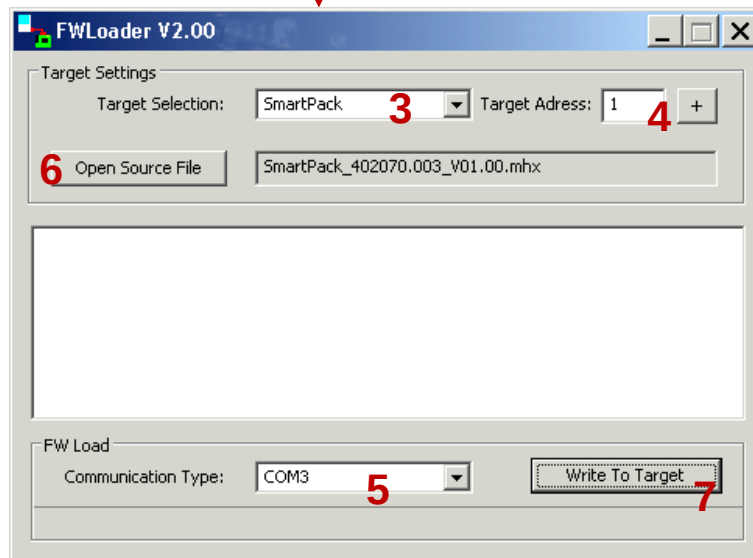
NOTICE: The *Smartpack* controller’s firmware and the firmware in the controller’s embedded Web adapter are different files, and require different upgrade procedures.

The *PowerSuite* program has to be installed previously on the PC.

To find your controller's firmware version, use the controller's front keys or other GUI or read how in the topic "Tutorials", in *PowerSuite Help*.

NOTICE: You can get a copy of the "*FWLoader*" program, by contacting Eltek's Service Dep.

Do following:



1. **Connect a PC to the Smartpack**, using a standard USB cable (1)
2. **Start the *FWLoader* program on the PC** (2)

On the *FWLoader* dialog box:

3. **Select "Smartpack"**, in Target Selection (3)
4. **Select "1"**, in Target Address (4)
5. **Select "COMx"** in Communication Type (5).
To find the communication port the PC uses to communicate with the controller, read topic Cannot Find the Com Port Number (page **Error! Bookmark not defined.**)
6. Click on the "Open Source File" button (6) and,
Select the file "*.mhx"
that contains the firmware to upgrade the controller with
7. **Click on the "Write to Target" button**, (7)
to load the firmware to the *Smartpack* controller

While the firmware is loaded to the *Smartpack* controller, the *FWLoader* program displays a progress bar, and the controller's display shows the currently programmed segment.

WARNING: Uploading the firmware may take up to 15 minutes.

Once the firmware has loaded, the *Smartpack* controller will automatically restart.

About the *FWLoader* Program

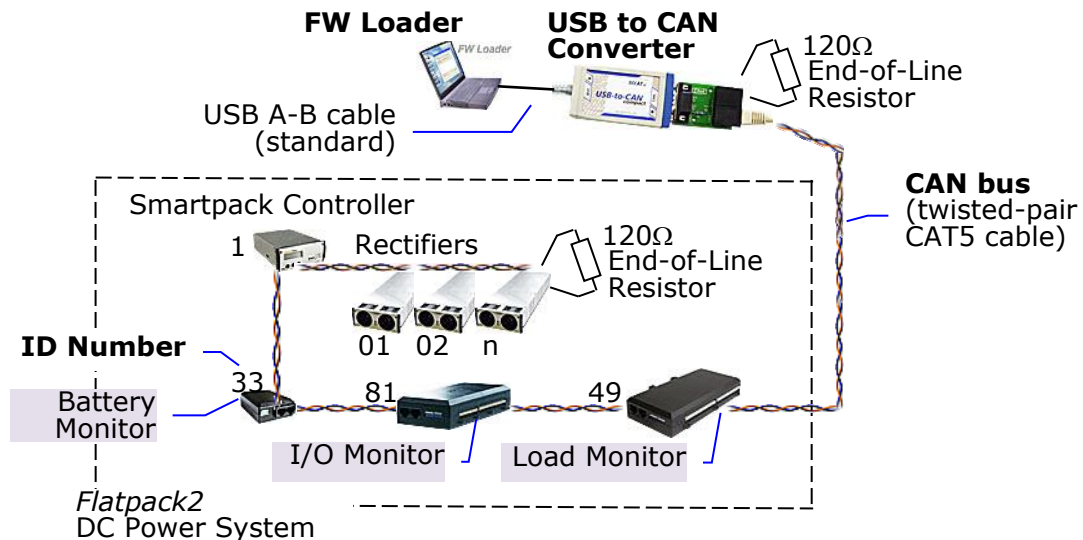
The *FWLoader* (FirmWare Loader) is a PC software application used to upgrade the firmware installed in your power system's control units, such as controller, rectifiers and other CAN Bus nodes.

FWLoader Online Help helps you using the *FWLoader* graphical user interface (GUI).

NOTICE:

Contact the *Eltek Service Dep.* if you need to upgrade the rectifier's firmware or any CAN Bus control units other than controllers.

Using an external PC and the USB-to-CAN Converter (art. 208565) you can upgrade the firmware installed in the *Flatpack2* rectifiers and any of the control units connected the system's CAN Bus.



The example above shows a *Flatpack2* power system with 3 CAN Bus nodes connected: a Battery Monitor, an I/O Monitor and a Load Monitor.

NOTICE:

USB-to-CAN Converter is not required to upgrade the firmware of the *Smartpack* controller. You connect the USB cable directly to the controller's USB port.

Firmware Upgrade – Controllers with Ethernet Port

You can use the “*Eltek Network Utility*” program running on a PC to upgrade the firmware on controllers equipped with embedded Web Adapters, such as the *Compact* controller and the *Smartpack2 Master* controller.

Also, you can use this program to upgrade other LAN devices, such as the **Web Adapter embedded in the *Smartpack* controller** and the **stand-alone *WebPower Adapter***.

NOTICE: You can visit www.eltek.com to download the “*Eltek Network Utility*” program, or contact Eltek's Service Dep.

Use this utility program, “EVIPSetup.exe”, to find your LAN device’s firmware version, or access the device or controller’s configuration pages in a web browser.

Do following:

NOTICE:

If you are upgrading the SB70 hardware platform, you have to carry out steps 2 - 7 below twice, due to the platform’s memory restrictions. The first time you select file “FreeRAM_V2_APP.s19” in step 5, and the second time you select the file “Webpower_SB70_xx_APP.s19”.

1. **Connect a PC to the controller or LAN device**

Read topic “[Networking the Controller - Access Methods](#)” on page 197

2. **Start the program “EVIPSetup.exe”,**
on the computer;

On the “Eltek Network Utility” program:

3. **Select the controller or LAN device**

that you want to update; Check correct MAC address and IP address

4. **Click the “Update Software” button**

5. **Click the “Browse” button,**

and select in the computer the firmware file (s19-format) that correspond to the selected LAN device (hardware platform)

Warning:

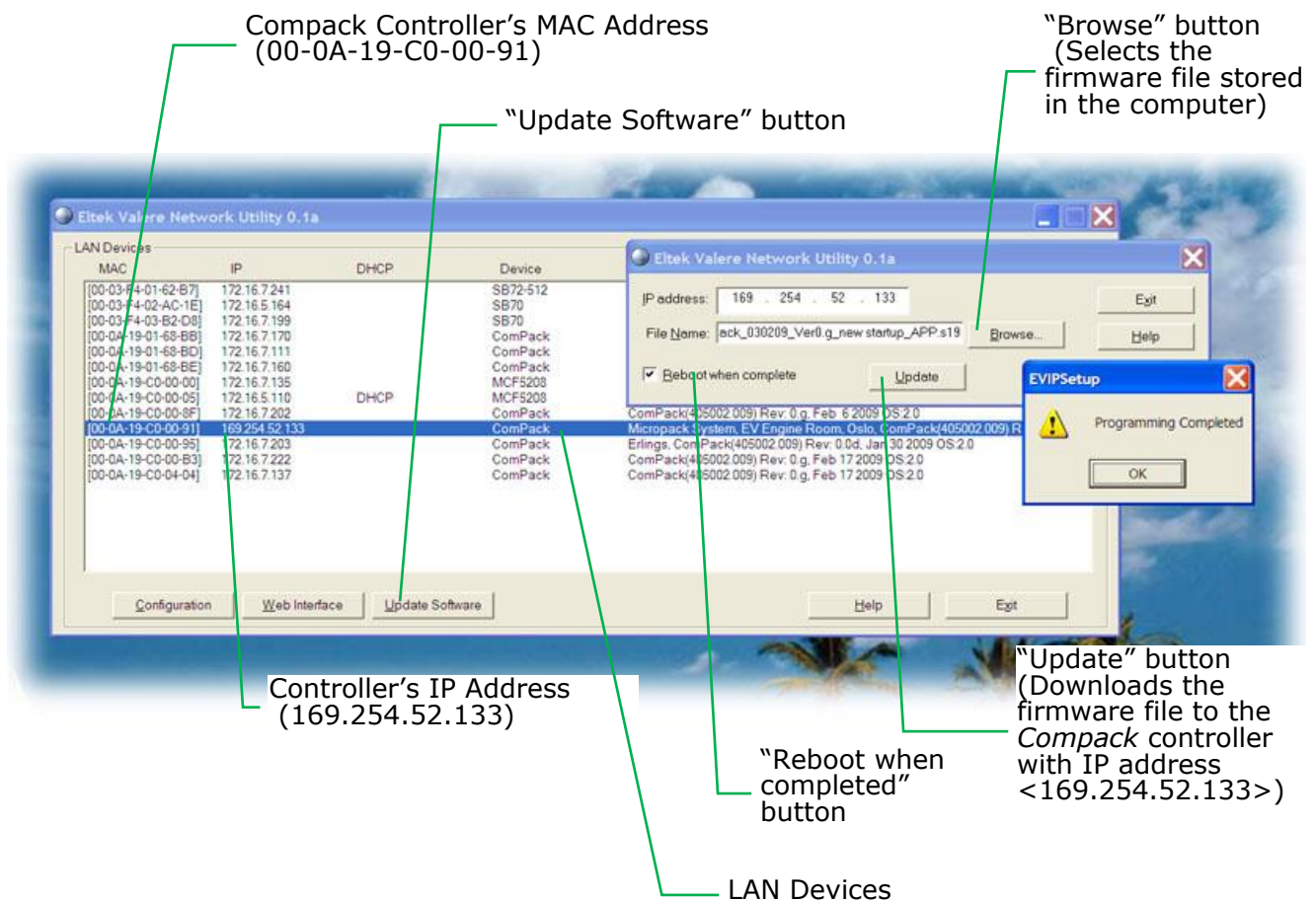
-- The upgrade will be aborted, if the selected LAN device platform and the firmware file do not match!

To learn more about firmware files, you can read topic “[Firmware Files and LAN Devices](#)” on page 340, and “[Content of WebPower Firmware ZIP File](#)” on page 344

6. **Check the “Reboot when complete” check box (marked)**

7. **Click the “Update” button**

the utility will download and update the firmware to the controller or LAN device with the selected IP address



(The "Eltek Network Utility" program. Example of CompPack controller's data)

While the firmware is downloaded to the controller or LAN device, the utility program displays a progress bar.

Once the firmware has loaded, the controller must restart. It will restart automatically, because you left the "Reboot when complete" check box checked (marked).

Firmware Upgrade - Smartpack's Embedded Web Adapter

The procedure to upgrade the firmware of the **Web Adapter embedded in the Smartpack controller** -- using the "Eltek Network Utility" program -- is the same as described in topic "[Firmware Upgrade – Controllers with Ethernet Port](#)" on page 337.

NOTICE:

The *Smartpack* controller's firmware and the firmware in the controller's embedded Web adapter are different files, and require different upgrade procedures.

Firmware Upgrade – Stand-alone WebPower Adapter

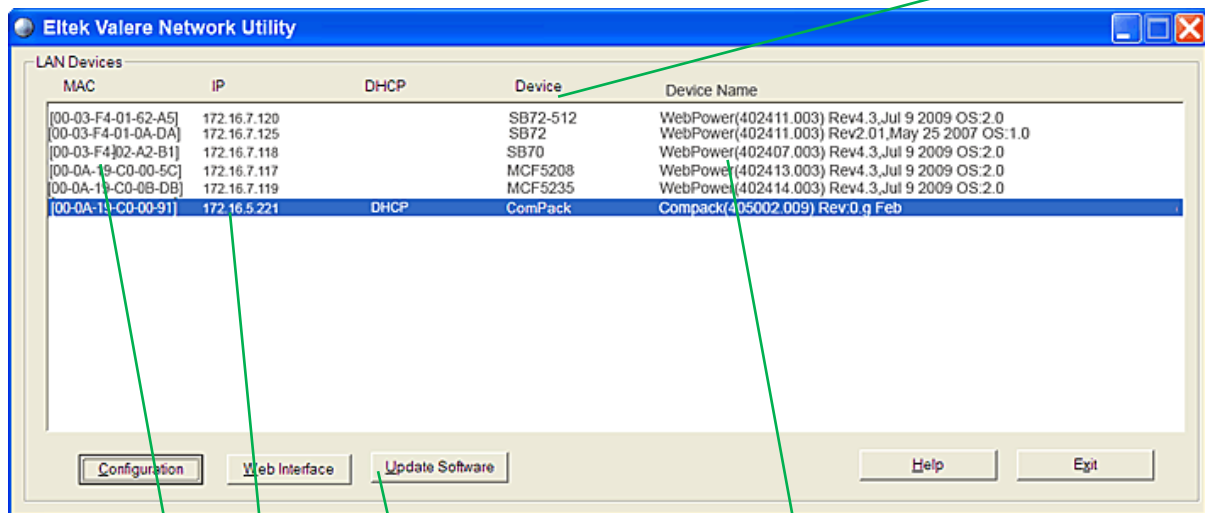
The procedure to upgrade the firmware of the stand-alone *WebPower Adapter* -- using the "Eltek Network Utility" program -- is the same as described in topic "[Firmware Upgrade – Controllers with Ethernet Port](#)" on page 337.

Firmware Files and LAN Devices

The “**Eltek Network Utility**” program (EVIPSetup.exe) displays useful information about the devices connected to a LAN. The figure shows six different connected devices.

LAN Devices:

- SB72 and SB72-512 (Stand-alone WebPower Adapter)
- SB70, MCF5208 and MCF5235 (Embedded in Smartpack controller)
- Compack (Embedded in Compack controller)
- Smartpack2 Master (Embedded in Smartpack2 Master controller) not displayed



“Update Software” button

(Example of different LAN Devices’ data)

DHCP obtained IP Address

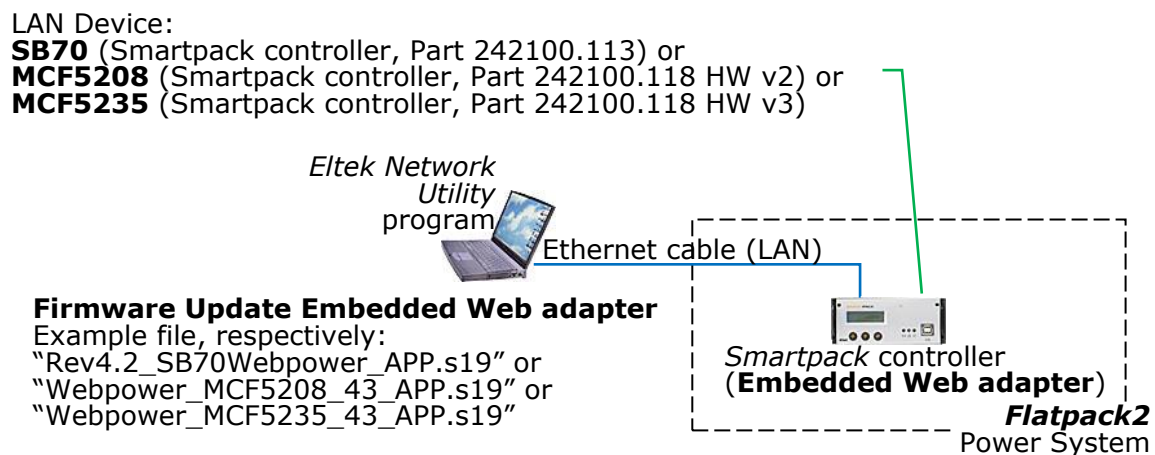
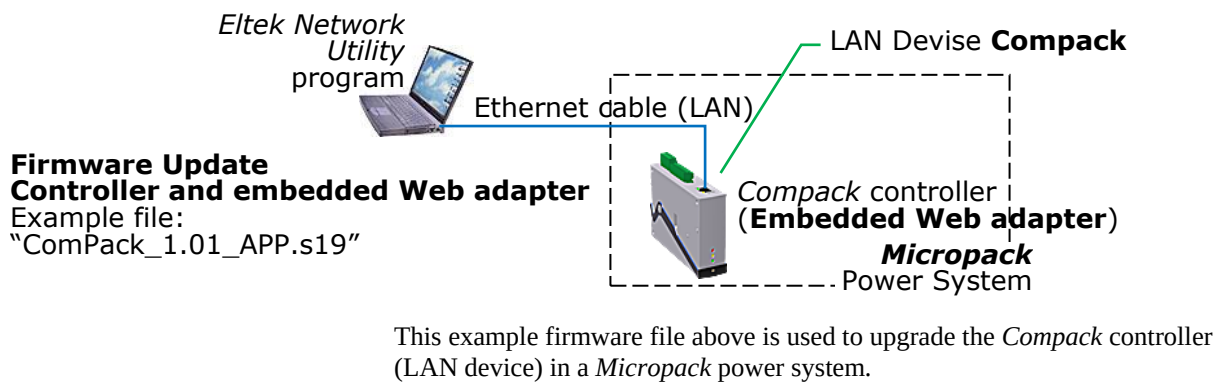
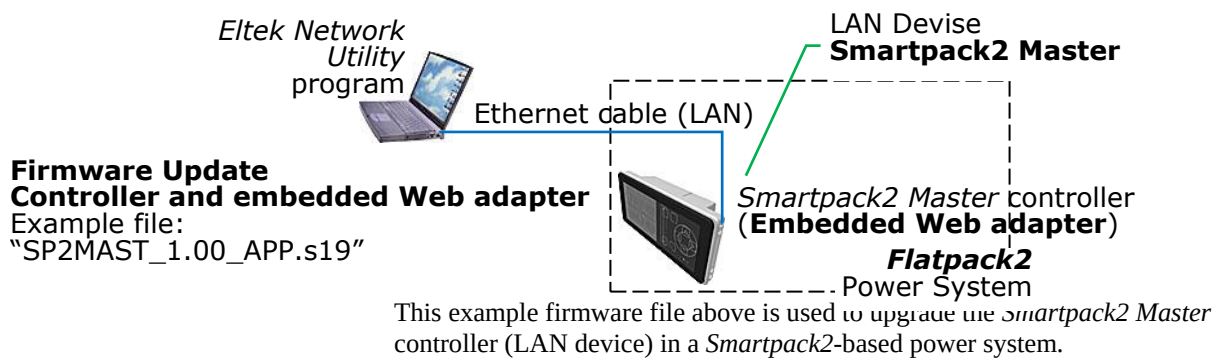
LAN Devices’ MAC Addresses

LAN Devices’ Device Name and firmware revision

The program’s “**Update Software**” button enables you to upgrade the firmware of the selected LAN device, by transferring a firmware file (s19-format) from a LAN connected computer to the device (or hardware platform).

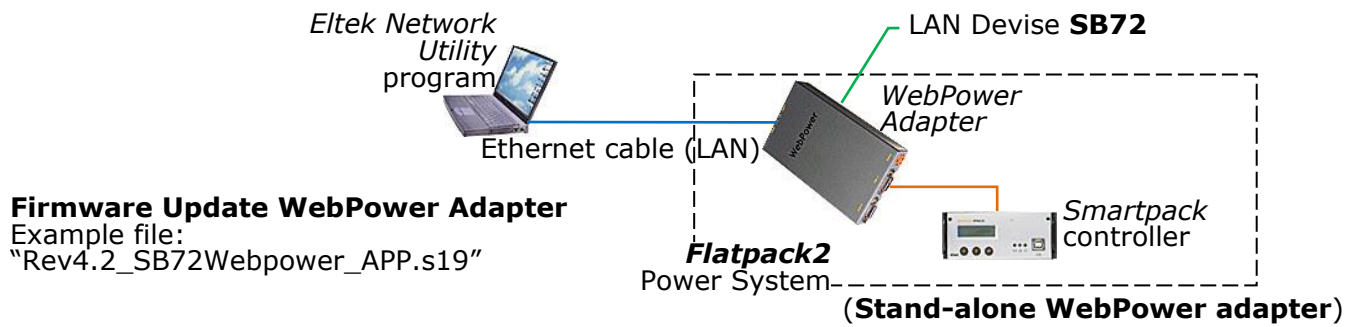
The figures below show examples of firmware files and available type of LAN devices (or hardware platforms).

LAN Devices Embedded in the Controller

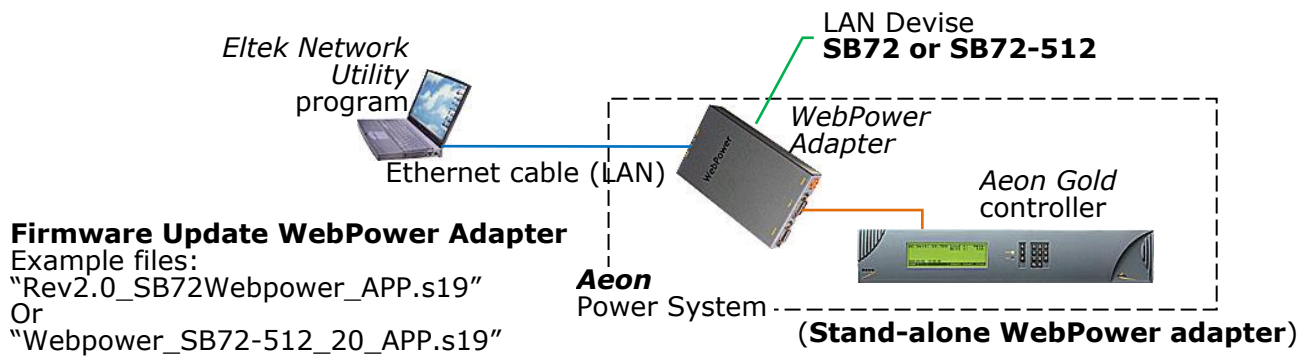


Example firmware files above are used to upgrade the Web adapter (LAN device) embedded in the controller of a *Flatpack2* power system. Each file corresponds to one of the LAN devices (or hardware platforms).

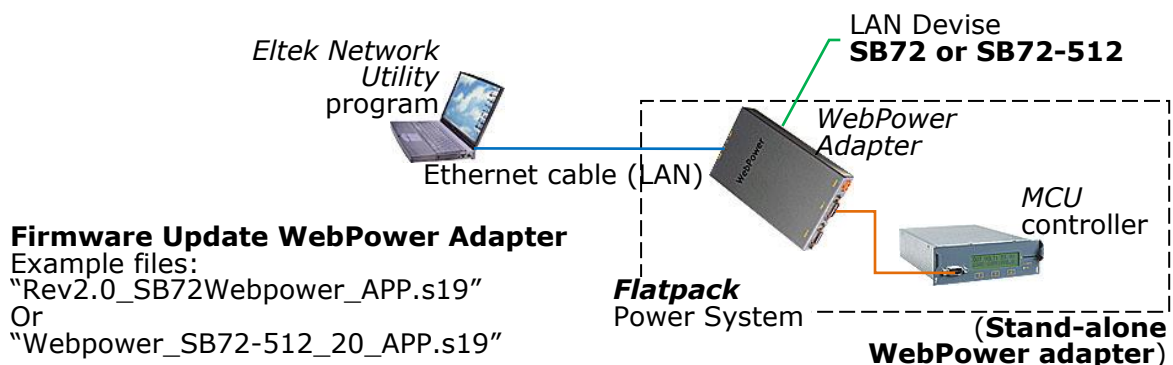
Stand-alone LAN Devices



This example firmware file above is used to upgrade the stand-alone *WebPower Adapter* (LAN device) in a *Flatpack2* power system.



The example firmware files above are used to upgrade the stand-alone *WebPower Adapter* (LAN device) in an *Aeon* power system. Each file corresponds to one of the LAN devices (or hardware platforms). Note that version 2.0 is always the highest version available for these firmware files.



The example firmware files above are used to upgrade the stand-alone *WebPower Adapter* (LAN device) in a *Flatpack* power system. Each file corresponds to one of the LAN devices (or hardware platforms). Note that version 2.0 is always the highest version available for these firmware files.

WARNING: The upgrade will be aborted, if the selected LAN device (or software platform) and the firmware file do not match.

Overview LAN Devices and Firmware Files (PC - S19 Format)

The “*Etek Network Utility*” program <EVIPSetup.exe> will transfer the specific firmware file (s19-format) from a LAN connected computer to the device (or hardware platform).

LAN Device	File Name (examples)	File Type
<i>Smartpack2 Master</i>	SmartPack2_Master_405006.009_1.3_APP.s19	Firmware upgrade Controller & embedded Web Adapter
<i>Compack</i>	ComPack_xx.xx_APP.s19	Firmware upgrade Controller & embedded Web Adapter
<i>Smartpack</i> (Part 242100.113)	Rev4.2_SB70Webpower_APP.s19	Firmware upgrade embedded Web Adapter
<i>Smartpack</i> (Part 242100.118, HW v2)	Webpower_MCF5208_43_APP.s19	Firmware upgrade embedded Web Adapter
<i>Smartpack</i> (Part 242100.118, HW v3)	Webpower_MCF5235_43_APP.s19	Firmware upgrade embedded Web Adapter
<i>WebPower Adapter SB72</i>	Rev4.2_SB72Webpower_APP.s19	Firmware upgrade Web Adapter (stand-alone with <i>Smartpack</i>)
<i>WebPower Adapter SB72</i>	Rev2.0_SB72Webpower_APP.s19	Firmware upgrade Web Adapter (stand-alone with <i>Aeon Gold</i>)
<i>WebPower Adapter SB72-512</i>	Webpower_SB72-512_20_APP.s19	Firmware upgrade Web Adapter (stand-alone with <i>Aeon Gold</i>)
<i>WebPower Adapter SB72</i>	Rev2.0_SB72Webpower_APP.s19	Firmware upgrade Web Adapter (stand-alone with <i>MCU</i>)
<i>WebPower Adapter SB72-512</i>	Webpower_SB72-512_20_APP.s19	Firmware upgrade Web Adapter (stand-alone with <i>MCU</i>)

The “xx.xx” refers to the firmware file’s version number.

Overview Firmware Files (SD Card - Binary Format)

You can store binary files in the *Smartpack2 Master* controller’s SD card (data storage device) and use them for firmware upgrading of controllers and control units, as well as for exporting and importing configuration files.

NOTICE:

All firmware upgrade and configuration files stored in the SC card must have specific file names.

The SD card uses the 8.3 file name format. Before using the files stored SD card, you must rename them, so that they conform to the specific file names described below.

For example, if you receive the file “SmartPack2_Basic_405007.009_V1.1.mhx” to upgrade your *Smartpack2 Basic* controller firmware to version 1.1, you must first rename the file to exactly “SP2BAS.MHX”, then copy the file to the SD card and finally insert the SD card in the *Smartpack2 Master* controller to start the firmware upgrade process.

#	CAN Node	File Name	File Type	CAN Node Type
	<i>Smartpack2 Master</i>	SP2MAST.BIN	Firmware upgrade	Controller
	<i>Smartpack2 Basic</i>	SP2BAS.MHX	Firmware upgrade	Controller
	<i>Smartpack</i>	SP.MHX	Firmware upgrade	Controller

#	CAN Node	File Name	File Type	CAN Node Type
	<i>Smartnode</i>	SMARTNOD.MHX	Firmware upgrade	Control Unit
	<i>Battery Monitor</i>	BATTMON.HEX	Firmware upgrade	Control Unit
	<i>Load Monitor</i>	LOADMON.HEX	Firmware upgrade	Control Unit
	<i>AC Mains Monitor</i>	MAINSMON.HEX	Firmware upgrade	Control Unit
	<i>I/O Monitor</i>	IO_UNIT.HEX	Firmware upgrade	Control Units: I/O Monitor, Monitor2 & Monitor3
	Any node	UNIT_aa.HEX	Configuration File (Save/Load)	All types

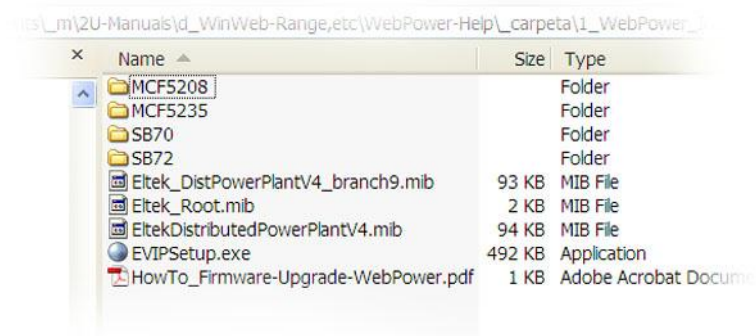
The “aa” refers to the CAN bus address or ID number.
E.g. “UNIT_82.HEX” could be the configuration file for I/O Monitor with CAN bus address 82.

When upgrading the firmware of controllers and control units — if several units of the same type are connected to the CAN bus — the *Smartpack2 Master* controller will request you to specify the CAN bus ID number of the unit to upgrade.

Content of WebPower Firmware ZIP File

The *WebPower* firmware ZIP file contains the “*Eltek Network Utility*” program (EVIPSetup.exe) and all the specific firmware files (s19-format) and MIB files.

The figure below shows the file structure created when you unzip the *WebPower* firmware ZIP file “*Webpower RevX.X hexfiles and MIB, All targets.zip*” to an empty folder in your computer.



The *WebPower* firmware ZIP file contains the following files:

- **EVIPSetup.exe**
The “*Eltek Network Utility*” PC program, which requires no installation
- **Folders for Web-based devices or LAN Devices** (or hardware platforms)
Each folder contains the firmware file (s19-format) to upgrade the corresponding device (hardware platform).
E.g. to upgrade a MCF5235 device, you must use the file
“Webpower_MCF5235_43_APP.s19” which you find in the MCF5235 folder
- **MIB files (*.mib)**
The *Eltek*’s device specific MIB files (Management Information Base) contain device description data, which is used by other SNMP requester devices in a Network Management System (NMS).
Read also topic “[About Eltek’s SNMP MIB Files](#)” on page 212
- **“HowTo_Firmware-Upgrade-WebPower.pdf” file**
Or similar file e.g. “*HowTo_Firmware-Upgrade-Controllers-LAN-devices.pdf*”, with

detailed description of how to upgrade the firmware and of the content of the *WebPower* firmware ZIP file (this topic).

Notice:

Some *WebPower* firmware ZIP files may only contain firmware files for some targets, instead of for all targets, e.g. file "*WebPower Rev4.5 hexfiles and MIB, Targets-MCF5208, MCF5235.zip*" will only display folders for these targets; folders for the SB70 and SB72 are then not included.

CAN bus Addressing

The *Eltek* DC power systems utilize the CAN bus -- a digital interface architecture that supports a dedicated communication channel between the controllers and each of the rectifiers.

Refer also to topic "[CAN bus Termination](#)" on page 246.

All rectifiers and control units (controllers and CAN nodes) connected to the *Eltek*'s CAN bus must have a unique address or ID number.

The control system's master controller assigns automatically the rectifiers' addresses (**software assignment**).

The control system's control units and controllers -- except *Compack* and *Smartpack2 Master* -- use DIP switches for configuring their unique CAN bus ID number (**hardware assignment**).

NOTICE:

Compack controllers have no DIP switches, as they are configured from factory with CAN bus ID number <1> (not changeable).

Smartpack2 Master controllers have no DIP switches, as they are configured from factory with CAN bus ID number <11> (not changeable).

Software Assignment -- Rectifiers

Each rectifier in the DC power system is automatically configured by its main controller with a unique CAN bus ID number (software-assignment).

When the rectifiers are hot-plugged in the system the first time, the system's controller dynamically assigns the rectifiers with the next available ID number (software-assignment), and automatically increases the number of communicating rectifiers on the CAN bus. Also, the controller registers the rectifiers' ID numbers, or CAN bus address (01, 02...), together with their serial numbers.

When a previously installed rectifier is again hot-plugged in the power system, it retains its previous ID and serial number, unless reassigned during a Reset Rectifier command.

WARNING:

To replace installed rectifiers with new ones, remove the installed rectifiers and wait for the controller to notify communication error with the extracted rectifiers. Push the new rectifiers firmly inwards -- one module at a time, allowing a 2s delay -- to plug them in the power shelf. Start with the shelf position with lowest ID number. Lock their handles.

When a new controller is connected to an existing system, the controller will recalculate the number of connected rectifiers, reassigning them with the same ID numbers as they already have in memory.

Hardware Assignment -- Control Units

The control system consists of one or several CAN bus connected control units.

The control units are factory configured with a unique CAN bus ID number, using DIP switches on the side of units (hardware-assignment).

NOTICE:

Compack controllers have no DIP switches, as they are configured from factory with CAN bus ID number <1> (not changeable).

Smartpack2 Master controllers have no DIP switches, as they are configured from factory with CAN bus ID number <11> (not changeable).

For example, in a distributed DC power system with several *Smartpack* controllers, the master is configured with ID # <1>, the slave with ID # <2> and so on. Refer to “[CAN Bus Address Range -- Control Units](#)” on page 346.

CAN Bus Address Range -- Control Units

In the control system’s CAN bus, you can address a maximum of 14 CAN nodes of each type, 8 *Smartpack* and *Smartpack2 Basic* controllers and 8 *Smartnode* units. See table below:

Number of nodes >> Control Units' Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
Smartpack & Smartpack2 Basic Controllers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	<< ID #	
Smartnode Control Units	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	<< ID #	
Battery Monitor CAN nodes	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	<< ID #	
Load Monitor CAN nodes	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	<< ID #	
	**	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	<< ID #
I/O Monitor & I/O Monitor2 CAN nodes	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	<< ID #	
Mains Monitor CAN nodes	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	<< ID #	

ID numbers formatted in grey italics are not available due to software constraints.

** Only 4 of the 8 mounted DIP switches may be used (max. 14 Load Monitors may be connected).

NOTICE:

Compack controllers have no DIP switches, as they are configured from factory with CAN bus ID number <1> (not changeable).

Smartpack2 Master controllers have no DIP switches, as they are configured from factory with CAN bus ID number <11> (not changeable).

The table below shows the DIP switch position on *Smartpack* and *Smartpack2 Basic* controllers:

DIP switch position for Smartpack & Smartpack2 Basic controllers

Smartpack & Smartpack2 Basic Controller	ID #	DIP Switch Position			
		1	-- 2	-- 3	-- 4
Controller 1	1	OFF	--OFF	--OFF	--OFF
Controller 2	2	ON	--OFF	--OFF	--OFF
Controller 3	3	OFF	-- ON	--OFF	--OFF
Controller 4	4	ON	-- ON	--OFF	--OFF

Controller 5	5	OFF--OFF-- ON --OFF
Controller 6	6	ON --OFF-- ON --OFF
Controller 7	7	OFF-- ON -- ON --OFF
Controller 8	8	ON -- ON -- ON --OFF

Note that the controller's ID number corresponds to the DIP switch's binary value plus 1.

The table below shows the DIP switch position on *Smartnode* control units:

DIP switch position for *Smartnode* control units

Smartnode Control Unit	ID #	DIP Switch Position			
		1	2	3	4
Smartnode 1	17	OFF	OFF	OFF	OFF
Smartnode 2	18	ON	OFF	OFF	OFF
Smartnode 3	19	OFF	ON	OFF	OFF
Smartnode 4	20	ON	ON	OFF	OFF
Smartnode 5	21	OFF	OFF	ON	OFF
Smartnode 6	22	ON	OFF	ON	OFF
Smartnode 7	23	OFF	ON	ON	OFF
Smartnode 8	24	ON	ON	ON	OFF

Note that the control unit's ID number corresponds to the DIP switch's binary value plus 17.

The table below shows the DIP switch position on Battery Monitor CAN nodes:

DIP switch position for Battery Monitors

Battery Monitor CAN Node	ID #	DIP Switch Position			
		1	2	3	4
Node 1	33	OFF	OFF	OFF	OFF
Node 2	34	ON	OFF	OFF	OFF
Node 3	35	OFF	ON	OFF	OFF
Node 4	36	ON	ON	OFF	OFF
Node 5	37	OFF	OFF	ON	OFF
Node 6	38	ON	OFF	ON	OFF
Node 7	39	OFF	ON	ON	OFF
Node 8	40	ON	ON	ON	OFF
Node 9	41	OFF	OFF	OFF	ON
Node 10	42	ON	OFF	OFF	ON
Node 11	43	OFF	ON	OFF	ON
Node 12	44	ON	ON	OFF	ON
Node 13	45	OFF	OFF	ON	ON
Node 14	46	ON	OFF	ON	ON

Note that the node's ID number corresponds to the DIP switch's binary value plus 33.

The table below shows the DIP switch position on Load Monitor CAN nodes:

DIP switch position for Load Monitors

Load Monitor CAN Node	ID #	DIP Switch Position			
		1	2	3	4
Node 1	49	OFF	OFF	OFF	OFF
Node 2	50	ON	OFF	OFF	OFF
Node 3	51	OFF	ON	OFF	OFF
Node 4	52	ON	ON	OFF	OFF
Node 5	53	OFF	OFF	ON	OFF
Node 6	54	ON	OFF	ON	OFF
Node 7	55	OFF	ON	ON	OFF
Node 8	56	ON	ON	ON	OFF
Node 9	57	OFF	OFF	OFF	ON
Node 10	58	ON	OFF	OFF	ON
Node 11	59	OFF	ON	OFF	ON
Node 12	60	ON	ON	OFF	ON

Node 13	61	OFF--OFF-- ON -- ON
Node 14	62	ON --OFF-- ON -- ON

Note that the node's ID number corresponds to the DIP switch's binary value plus 49.

The table below shows the DIP switch position on I/O Monitor and I/O Monitor2 CAN nodes:

DIP switch position for I/O Monitor and I/O Monitor2

I/O Monitor & I/O Monitor2 CAN Node	ID #	DIP Switch Position			
		1	-- 2	-- 3	-- 4
Node 1	81	OFF	--OFF	--OFF	--OFF
Node 2	82	ON	--OFF	--OFF	--OFF
Node 3	83	OFF	-- ON	--OFF	--OFF
Node 4	84	ON	-- ON	--OFF	--OFF
Node 5	85	OFF	--OFF	-- ON	--OFF
Node 6	86	ON	--OFF	-- ON	--OFF
Node 7	87	OFF	-- ON	-- ON	--OFF
Node 8	88	ON	-- ON	-- ON	--OFF
Node 9	89	OFF	--OFF	--OFF	-- ON
Node 10	90	ON	--OFF	--OFF	-- ON
Node 11	91	OFF	-- ON	--OFF	-- ON
Node 12	92	ON	-- ON	--OFF	-- ON
Node 13	93	OFF	--OFF	-- ON	-- ON
Node 14	94	ON	--OFF	-- ON	-- ON

Note that the node's ID number corresponds to the DIP switch's binary value plus 81.

The table below shows the DIP switch position on Mains Monitor CAN nodes:

DIP switch position for Mains Monitor

Mains Monitor CAN Node	ID #	DIP Switch Position			
		1	-- 2	-- 3	-- 4
Node 1	97	OFF	--OFF	--OFF	--OFF
Node 2	98	ON	--OFF	--OFF	--OFF
Node 3	99	OFF	-- ON	--OFF	--OFF
Node 4	100	ON	-- ON	--OFF	--OFF
Node 5	101	OFF	--OFF	-- ON	--OFF
Node 6	102	ON	--OFF	-- ON	--OFF
Node 7	103	OFF	-- ON	-- ON	--OFF
Node 8	104	ON	-- ON	-- ON	--OFF
Node 9	105	OFF	--OFF	--OFF	-- ON
Node 10	106	ON	--OFF	--OFF	-- ON
Node 11	107	OFF	-- ON	--OFF	-- ON
Node 12	108	ON	-- ON	--OFF	-- ON
Node 13	109	OFF	--OFF	-- ON	-- ON
Node 14	110	ON	--OFF	-- ON	-- ON

Note that the node's ID number corresponds to the DIP switch's binary value plus 97.

Example:

In a DC power system with following control units: 2 *Smartpack* controllers, 1 Smartnode and 2 Load Monitors, you have to set their DIP switches as follows:

- First Smartpack controller:
ID# 1 (All DIP switches OFF)
- Second Smartpack controller:
ID# 2 (Only DIP switch 1 ON)

- First Smartnode:
ID# 17 (All DIP switches OFF)
- First Load Monitor:
ID# 49 (All DIP switches OFF)
- Second Load Monitor:
ID# 50 (Only DIP switch 1 ON)

System Inputs and Outputs - Overview

Following links shows you all available **inputs and outputs per control unit**.

The overview also specifies the input's or output's application, and whether the input requires calibration, configuration and scaling.

Read also the *Available Inputs and Outputs* topic for each of the control units, e.g. "[Available Inputs and Outputs](#)" on page 356 for the *Smartpack* controller.

Available System Current Sense Inputs

The DC power supply system may implement the following **number of Current Sense Inputs per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Batt. Current Sense Inputs	1	Current Sense	Battery Monitor	X		X	Battery shunt
Batt. Current Sense Inputs	2	Current Sense	Smartpack	X		X	Battery shunt
Current Sense Inputs	8	Current Sense	Load Monitor	X		X	Load shunts
Batt. Current Sense Inputs	1	Current Sense	Smartpack2 Basic	X		X	Battery shunts

Available System Fuse Monitoring Inputs

The DC power supply system may implement the following **number of Fuse Monitoring Inputs per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Batt. Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Battery Monitor		X	X	Battery fuse
Batt. Fuse Monitoring Config. Inputs	2	Fuse Monitoring	Smartpack		X	X	Battery fuse
Batt. Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Smartpack2 Basic		X	X	Battery fuse
Fuse Monitoring Config. Inputs	8	Fuse Monitoring	Load Monitor		X	X	Load breakers and ext. equip.
Load Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Smartpack2 Basic		X	X	Load breakers and ext. equip.
Load Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Smartpack		X	X	Load breakers and ext. equip.

Available System Alarm Relay Outputs

The DC power supply system may implement the following **number of Alarm Relay Outputs per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Alarm Relay Outputs	6	NC-C-NO Relay	I/O Monitor				Ext. control and alarming purposes

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Alarm Relay Outputs	6	NC-C-NO Relay	Smartpack				Ext. control and alarming purposes
Alarm Relay Outputs	6	NC-C-NO Relay	I/O Monitor2				Ext. control and alarming purposes
Alarm Relay Outputs	3	NC-C-NO Relay	Compact				Ext. control and alarming purposes

Available System Fan Control Inputs & Outputs

The DC power supply system may implement the following **number of Fan Control Inputs and Outputs per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
OCab Fan Speed Control Outputs	2	Fan Control	I/O Monitor				Fans in Outdoor Cabinets
OCab Fan Speed Monitoring Inputs	2	Fan Control	I/O Monitor				Tachometers in Outdoor Cabinets

Available System Programmable Inputs

The DC power supply system may implement the following **number of System Programmable Inputs per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Config. Inputs	3	Programmable	Compact	X	X		Temperature, door, fire, generator switches and other ext. equip.
Config. Inputs	6	Programmable	I/O Monitor		X		Door, fire, generator switches and other ext. equip.
Config. Inputs	6	Programmable	I/O Monitor2		X		Door, fire, generator switches and other ext. equip.
Config. Inputs	5	Programmable	Mains Monitor		X		AC Mains feed monitoring
Config. Inputs	6	Programmable	Smartpack		X		Door, fire, generator switches and other ext. equip.

Available System Temperature Sense Inputs

The DC power supply system may implement the following **number of System Temperature Sense Inputs per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Batt. Temp. Sense Inputs	1	Temperature Sense	Battery Monitor	X		X	Battery temperature (sensor embedded in box)
Batt. Temp. Sense Inputs	3	Temperature Sense	Smartpack2 Basic	X		X	Battery temperature
Batt. Temp. Sense Inputs	2	Temperature Sense	Smartpack	X		X	Battery temperature
OCab Temp. Sense Inputs	2	Temperature Sense	I/O Monitor	X		X	Temp. sensors in Outdoor Cabinets

Available System Voltage Inputs

The DC power supply system may implement the following **number of System Voltage Inputs per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Batt. Symmetry Inputs	4	Voltage Monitoring	Battery Monitor	X		X	Batteries
Batt. Symmetry Inputs	8	Voltage Monitoring	Smartpack	X		X	Batteries

Available System AC Measurement Inputs

The DC power supply system may implement the following **number of System AC Measurement Inputs** (AC voltage, current and frequency) **per control unit**:

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
AC Current Sense Inputs	3	AC Current Sense	Mains Monitor	X		X	AC Mains feed monitoring
AC Voltage Sense Inputs	3	AC Voltage Monitoring	Mains Monitor	X			AC Mains feed monitoring

All Available System Inputs & Outputs

Following table lists all available inputs and outputs per control unit, **sorted after the type of input or output**.

The overview also specifies the input's or output's application, and whether the input requires calibration, configuration and scaling.

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
AC Current Sense Inputs	3	AC Current Sense	Mains Monitor	X		X	AC Mains feed monitoring
AC Voltage Sense Inputs	3	AC Voltage Monitoring	Mains Monitor	X			AC Mains feed monitoring
Batt. Current Sense Inputs	1	Current Sense	Battery Monitor	X		X	Battery shunt
Current Sense Inputs	8	Current Sense	Load Monitor	X		X	Load shunts
Batt. Current Sense Inputs	2	Current Sense	Smartpack	X		X	Battery shunt
Batt. Current Sense Inputs	1	Current Sense	Smartpack2 Basic	X		X	Battery shunts
OCab Fan Speed Control Outputs	2	Fan Control	I/O Monitor	X	Pressure Test and Humidity Reduction		Fans in Outdoor Cabinets
OCab Fan Speed Monitoring Inputs	2	Fan Control	I/O Monitor	X	Pressure Test and Humidity Reduction		Tachometers in Outdoor Cabinets
Batt. Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Battery Monitor		X	X	Battery fuse
Fuse Monitoring Config. Inputs	8	Fuse Monitoring	Load Monitor		X	X	Load breakers and ext. equip.
Batt. Fuse Monitoring Config. Inputs	2	Fuse Monitoring	Smartpack		X	X	Battery fuse
Load Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Smartpack		X	X	Load breakers and ext. equip.
Batt. Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Smartpack2 Basic		X	X	Battery fuse

Input, Output	#	Type	Control Unit	Calibration	Configuration	Scaling	Application
Load Fuse Monitoring Config. Inputs	1	Fuse Monitoring	Smartpack2 Basic		X	X	Load breakers and ext. equip.
Alarm Relay Outputs	3	NC-C-NO Relay	Compact				Ext. control and alarming purposes
Alarm Relay Outputs	6	NC-C-NO Relay	I/O Monitor				Ext. control and alarming purposes
Alarm Relay Outputs	6	NC-C-NO Relay	I/O Monitor2				Ext. control and alarming purposes
Alarm Relay Outputs	6	NC-C-NO Relay	Smartpack				Ext. control and alarming purposes
Config. Inputs	3	Programmable	Compact	X	X		Temperature, door, fire, generator switches and other ext. equip.
Config. Inputs	6	Programmable	I/O Monitor		X		Door, fire, generator switches and other ext. equip.
Config. Inputs	6	Programmable	I/O Monitor2		X		Door, fire, generator switches and other ext. equip.
Config. Inputs	5	Programmable	Mains Monitor		X		AC Mains feed monitoring
Config. Inputs	6	Programmable	Smartpack		X		Door, fire, generator switches and other ext. equip.
Batt. Temp. Sense Inputs	1	Temperature Sense	Battery Monitor	X			Battery temperature (sensor embedded in box)
OCab Temp. Sense Inputs	2	Temperature Sense	I/O Monitor	X	X		Temp. sensors in Outdoor Cabinets
Batt. Temp. Sense Inputs	2	Temperature Sense	Smartpack	X			Battery temperature
Batt. Temp. Sense Inputs	3	Temperature Sense	Smartpack2 Basic	X			Battery temperature
Batt. Symmetry Inputs	4	Voltage Monitoring	Battery Monitor	X			Batteries
Batt. Symmetry Inputs	8	Voltage Monitoring	Smartpack	X			Batteries

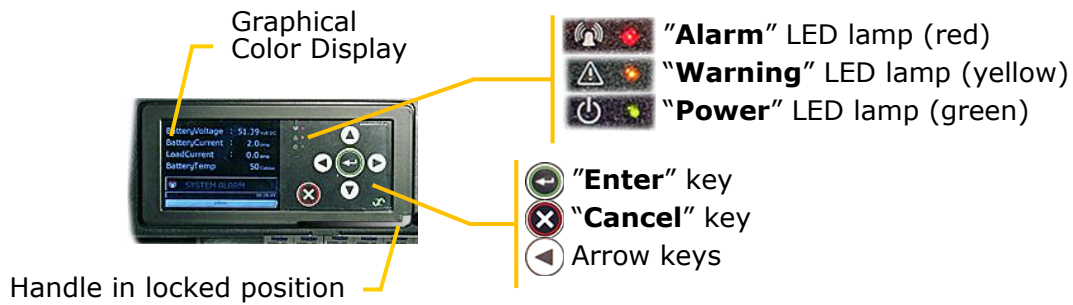
Control Units, Controllers, CAN Nodes, etc

All control units – controllers, monitors, CAN nodes, etc – connected to the power system's CAN bus represent the DC power system's control system.

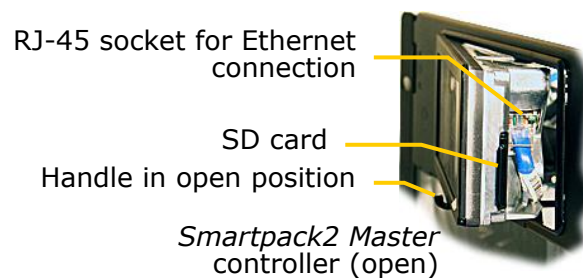
The Smartpack2 Master Controller - Overview

The *Smartpack2 Master* controller serves as the local user interface between you and the power system.

The *Smartpack2 Master* controller is 2U high and 160mm wide, and it is mounted in the power system's front panel or door. The CAN bus is the only connection between the *Smartpack2 Master* and the *Smartpack2 Basic* controller, which provides great installation flexibility.



The *Smartpack2 Master* controller is based upon a 3.2" TFT 32k color display for local monitoring and configuration. The display has QVGA (320 x 240) resolution and high contrast, for excellent reading from long distances and angles. For easy screen navigation, it is equipped with a large touchpad, based on the widely used "capacitive sense" principle.



A computer -- connected to the controller's RJ-45 Ethernet socket -- enables system configuration via a standard web browser (*WebPower*).

The *Smartpack2 Master* controller is also equipped with a non-volatile memory card slot, which accepts standard SD Cards (Secure Digital Card).

The SD Card can be used to store a backup of the complete power system configuration and setup. The SD Card is also suitable for extending of system's event log, data log and energy logs, and for firmware upgrading purposes.

Read also topic "[Menu Options - Smartpack2 Master Controller](#)" on page 182.

The *Smartpack2* Basic Controller - Overview

The *Smartpack2* Basic controllers are powerful modules used as slave controllers in the distributed control system of *Smartpack2*-based power supply systems.

They are developed for monitoring and controlling of the power system's internal functionality and to supply distributed power for connected CAN nodes. They can also operate in stand-alone mode, maintaining normal operation of the system, thus providing redundancy and improving system reliability.

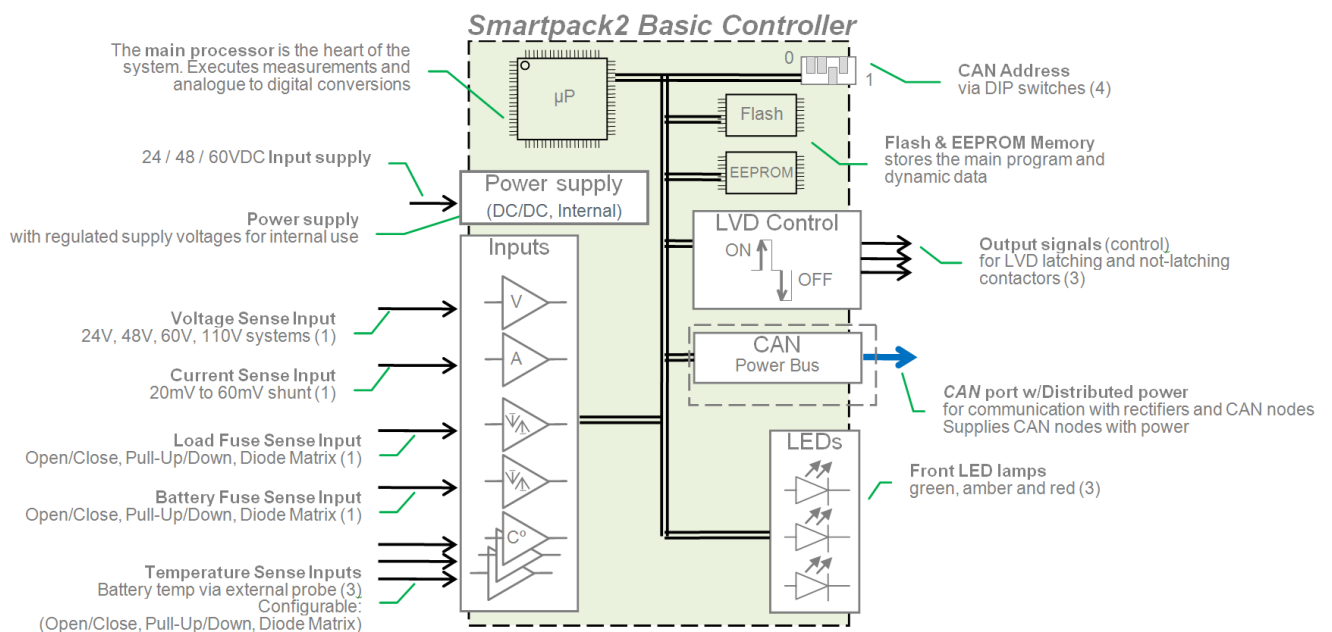


You can operate the system locally with a computer, via a standard web browser or using *PowerSuite* program -- or remotely via Ethernet and the Web. The module then communicates via CAN bus with its *Smartpack2 Master*, which uses its Ethernet port to interface with a local PC, SNMP.

Read also about methods of accessing the controller in topic “[Networking the Controller - Access Methods](#)” on page 197, and methods of configuring the power system in topic “[Power System Configuration & Monitoring – Methods](#)” on page 206.

For information about the *Smartpack2 Basic* controller’s Earth Fault Detection function, read topic “[Earth Fault Detection](#)” on page 244.

Block Diagram



Available Inputs and Outputs

Each *Smartpack2 Basic* controller is equipped with several inputs and outputs that you may use for internal system monitoring and control purposes. The following inputs and outputs are internally available for system implementation:

- 1 Voltage sense input (for system voltage)
- 1 Battery Fuse Fail input
- 1 Load Fuse Fail input
- 1 Current sense input
- 3 Temperature Sense inputs (for battery monitoring)
- 3 LVD outputs (for controlling latching and non-latching contactors)

For a complete sorted overview of available inputs and outputs, see “[System Inputs and Outputs - Overview](#)” on page 349.

The Smartpack Controller - Overview

The *Smartpack* controller is a monitoring and control unit used as the vital nerve center of the DC power plant. You operate the system from the elegant front panel, using three front keys and the LCD-display. They represent the main interface between you and the system.

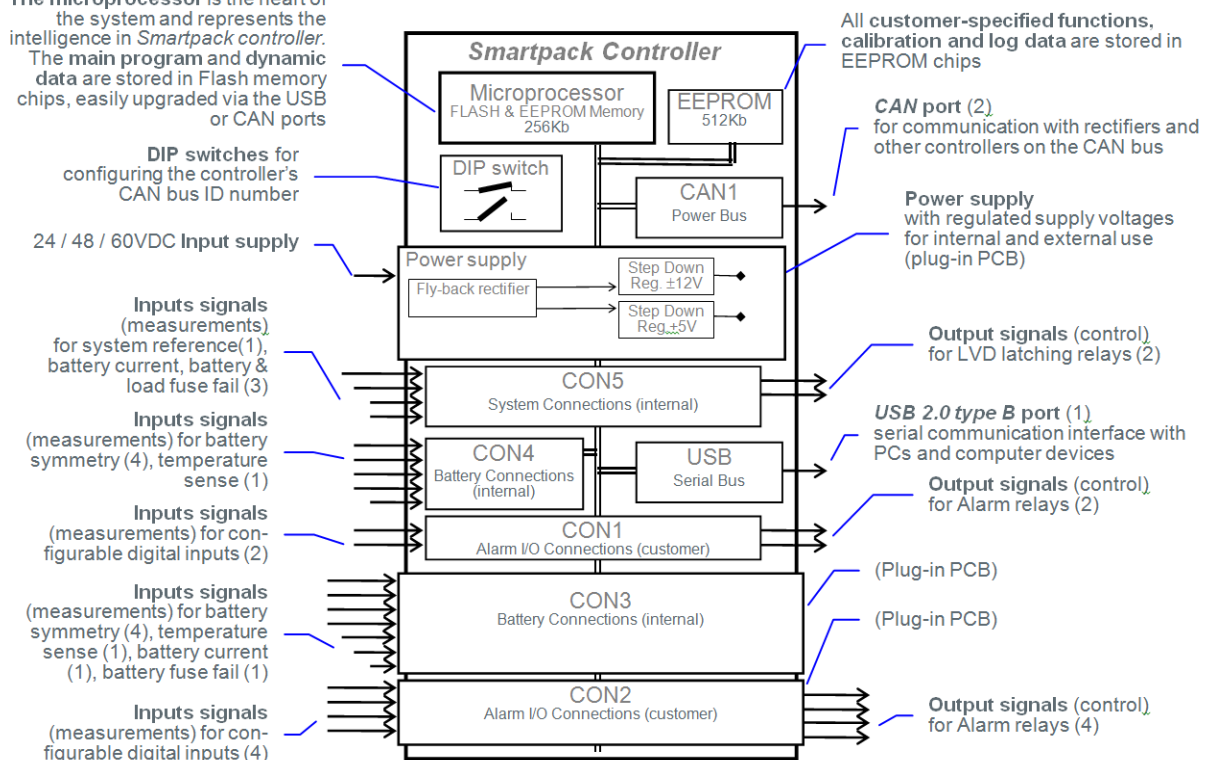


You can also operate the system locally via a PC using *Eltek's PowerSuite* application, or remotely via modem, Ethernet and the Web. The module then utilizes the USB- or RS-232 ports to interface with a local PC, SNMP or Web adapters.

Read also topics about methods of accessing the controller “[Networking the Controller - Access Methods](#)” on page 197, and methods of configuring the power system “[Power System Configuration & Monitoring – Methods](#)” on page 206.

Block Diagram

The microprocessor is the heart of the system and represents the intelligence in *Smartpack controller*. The main program and dynamic data are stored in Flash memory chips, easily upgraded via the USB or CAN ports



Available Inputs and Outputs

Each *Smartpack* controller may be equipped with several inputs and outputs that you may use for monitoring and control purposes. The following inputs and outputs are available to the user:

- 8 Battery Symmetry inputs
(4 on CON4 and 4 on CON3)
Read “[Battery Symmetry Measurements](#)” on page 296
- 2 Battery Current inputs
(1 on CON5 and 1 on CON3)
- 2 Battery Fuse Fail inputs
(1 on CON5 and 1 on CON3)
- 2 Temperature Sense inputs
(1 on CON4 and 1 on CON3)
- 1 Load Fuse Fail input (on CON5)
- 6 Configurable Digital inputs
(2 on CON1 and 4 on CON2)
- 6 Alarm Relay outputs
(2 on CON1 and 4 on CON2)

For a complete sorted overview of available inputs and outputs, see “[System Inputs and Outputs - Overview](#)” on page 349.

Smartpack Hardware Options

The *Smartpack* is a scalable controller with modular design. It can be optimized for different requirements by means of plug-in-kits. Various *Smartpack* controller options are available.

- Smartpack Controller, **Standard**
(local monitoring features)
- Smartpack Controller, **Ethernet**
(remote system monitoring via Ethernet)
- Smartpack Controller, **RS232 (front and rear access)**
(remote system monitoring via modem)
- Smartpack Controller, **Basic Slave**
(as Standard, but front display, keys and internal power supply are not implemented)

For more information about these *Smartpack* hardware options, read the “*User Guide Smartpack Monitoring and Control Unit*”, doc. 350003.013.

Smartpack Menu Options

The *Smartpack*-based DC power system’s functionality is accessed via a network of software menus and submenus, enabling you to configure and control the whole power system.

The functionality is divided in two different hierarchical menu structures: the **User Options** menus and the **Service Options** menus (password protected, only authorized personnel have access to them).

Special, not so frequently used options -- such as calibration and adjustments -- are accessible in the Service Options sub-menus.

The examples below represent an overview of software menus and submenus implemented in the *Smartpack* controller with 3.05 firmware.

User Option

Example of the **User Options** software menus and submenus implemented in the *Smartpack* controller with 3.05 firmware.

Level 2

Level 3

User menu <UserOption>

AlarmReset→	Reset
VoltageInfo →	NomVolt BoostVolt LoBattMaj LoBattMin HiBattMaj HiBattMin LVBD LVLD 1.1
DisplayMessages→	Message ↓↑
SoftwareInfo→	nnnnnn.nnn vv.vv
SerialNumber→	xxxxxx
Module Info →	Rectifier nn Mod.Current↓↑ Mod.Serial #↓↑ Mod.InputVolt↓↑ Mod.Status↓↑ 3v03 Mod.Temp↓↑ Mod.OutputVolt↓↑ Mod.SW Ver↓↑ DCDC24 nn 3v03 DCDC48 nn 3v03 SolarCharger nn 3v03
Mains Info →	NoOfPhases nn MainsStatus MainsVoltage
Temp Level Info→	Level ↓↑
BatteryInfo →	NoOfString Nn BattMonitorCurr ↓↑ 3v05 SmartPackCurr ↓↑ 3v05 SmartPackTemp ↓↑ 3v05 SmartPackSymm ↓↑ 3v05
Energy log →	Battery H-D-W-U↓↑ 3v03 SolarCharger H-D-W-U↓↑ 3v03 Generator H-D-W-U↓↑ 3v03 Rectifier H-D-W-U↓↑ 3v03 Load H-D-W-U↓↑ 3v03
LoadMonitor Info→	LoadMonitor ↑↓ V-A-W-Tot 3v05

The "XvX" references, if any, on the right hand of the option, are not shown in the display. They only indicate the firmware version (402073.009 XvX) the option was first implemented or updated.

Firmware 402073.009 3v05 Smartpack, Distributed

The "XvX" references, if any, on the right hand of the option, are not shown in the display. They only indicate the firmware version (402073.009 XvX) the option was first implemented or updated.

Service Options

Example of the **Service Options** software menus and submenus implemented in the *Smartpack* controller with 3.05 firmware.

Level 2

Level 3



Service menu <ServiceOption>

Change Language →	English	↓↑	2v0
VoltAdjustment →	NomVolt	↓↑	
	BoostVolt	↓↑	
	LoBattMaj	↓↑	
	LoBattMin	↓↑	
	HiBattMaj	↓↑	
	HiBattMin	↓↑	
	LVBD	↓↑	
	LVLd 1.1	↓↑	
VoltCalibration →	VoltCal	↓↑	
ChangePassword →	Password	↓↑	
SetManBoostTime →	↓↑		
Start/StopBoost →	Start/Stop		
Auto Boost Config. →	Enable/Disable	↓↑ & Threshold ↓↑	
Batt Test Setup →	Nxt Test DateTime	Date ↓↑ Time ↓↑	
	End Volt	↓↑	
	MaxTestDur	↓↑	
	Test Int	↓↑	
	Guard Time	↓↑	
Start/Stop Test →	Start/Stop		
RemoveUnit(s) →	Rem	↑ (Reset)	3v03
Rectifier Setup →	Rectifier ON/OFF**	↓↑	3v03
	System ON/OFF**	↓↑	3v03
	RectWalkInTime	Short/Long	3v03
Charge Curr Lim. →	Enable/Disable	↓↑	3v03
	MainsFeed	↓↑	3v03
	GenFeed	↓↑	3v03
Battery Setup →	NumOfStrina	↓↑	
	CellCap Ah nn	↓↑	
	BatteryTempSet	#.Enable/Disable,Alarms,Calib	3v04
	BatteryCurrentCalib	LowPoint/HighPoint	3v04
	Slope mV/C	↓↑	3v05
Output Control →	VoltageCtrl / TempComp	↓	
Change Date/Time →	Date ↓↑ Time ↓↑		
RelayTest →	Alarm Output 1	↑	
	Alarm Output 2	↑	
	Batt Contactor	↑	
	Load Contactor	↑	
	Alarm Output nn	↑	
BlockOutputs →	Enter OutpBlocked / Exit OutpBlocked		2v0
BattLifeTime Rst →	Reset		
Reboot CtrlUnit →	Yes/No		3v03
NoOfPhases →		↓↑	3v03
EfficiencyManaqr	Disable		3v03
	HE Priority		3v03
	Enable	Redundancy(E/D)OfTime↓↑ShuffleTime↓↑	3v03

Firmware 4.02073.0.03 3v05 Smartpack, Distributed

The "XvX" references, if any, on the right hand of the option, are not shown in the display. They only indicate the firmware version (402073.009 XvX) the option was first implemented or updated.

** Only available for special regions, when enabled from factory

The Compack Controller - Overview

The *Compack* controller is a DIN rail mounted monitoring and control unit used in the *Micropack* DC power systems. The controller is also used in larger *Eltek*'s *Compack*-based power systems.



It monitors and controls the whole system, and implements several network protocols for local and remote system configuration via web browser and existing network management system (NMS).

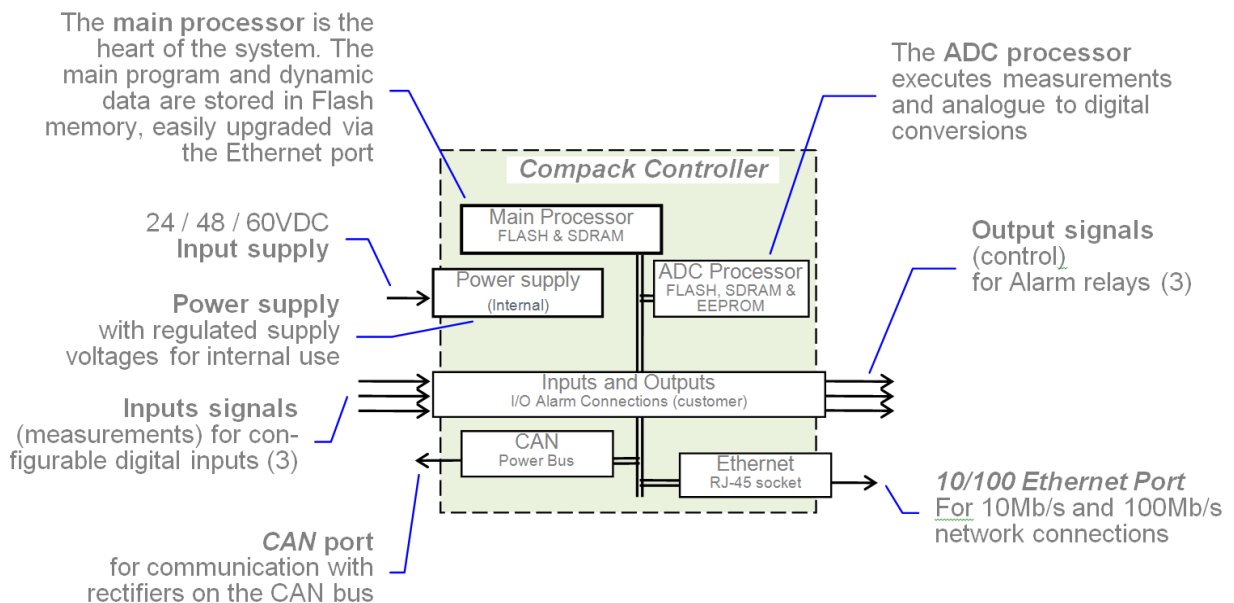
Using the UDP tunneling protocol, the powerful *PowerSuite* application may also be used for system configuration from a local or remote Internet connected personal computer.

You can easily connect the *Compack* controller to an Ethernet networked computer, plugging a standard Ethernet cable to the RJ-45 socket on top of the controller and to any available Ethernet socket on the network.

The *Compack* controller has the following LED indications:

- Alarm (red) indicates an alarm situation (major alarm)
- Warning (yellow) indicates an abnormal situation (minor alarm)
- “Power” (green) indicates that the power supply is ON or OFF
- Read also topics about methods of accessing the controller “[Networking the Controller - Access Methods](#)” on page 197, and methods of configuring the power system “[Power System Configuration & Monitoring – Methods](#)” on page 206.

Block Diagram



Available Inputs and Outputs

The *Compack* controller's I/O cables are connected to pluggable terminal blocks located on the controller's top. These connections are used for monitoring and controlling the status of external equipment, using configurable inputs and voltage-free alarm relays contacts.

The following inputs and outputs are available to the user:

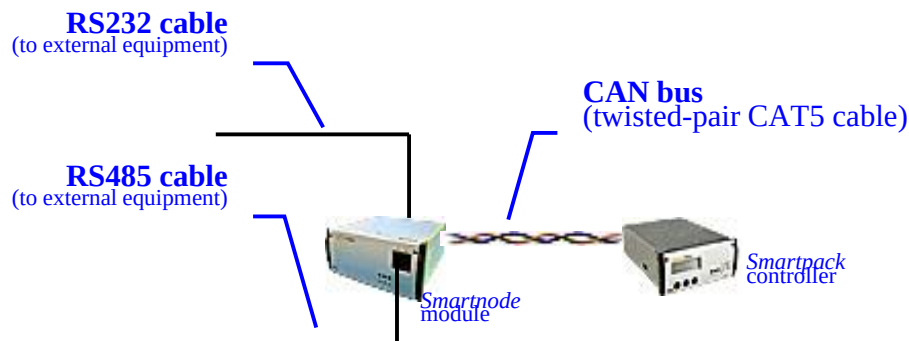
- 3 Configurable Digital inputs
(Voltage and temperature measurements)
- 3 Alarm Relay outputs
(NC-C-NO)

For a complete sorted overview of available inputs and outputs, see “[System Inputs and Outputs - Overview](#)” on page 349.

For more information about the *Compack* controller, read the “*User Guide Compack Monitoring and Control Unit*”, doc. 350011.013.

The *Smartnode* Control Unit - Overview

The *Smartnode* control unit is a CAN bus node that serves as a software protocol translator module. It can be customized to enable the *Smartpack* controller to communicate with third-party equipment using specific RS232 and RS485 serial protocols.



The *Battery Monitor* Control Unit - Overview

The *Battery Monitor Control Unit* is a CAN bus node that enables you to decentralize and increase the number of battery symmetry measurements in your DC power supply system. Also, it monitors the battery compartment temperature using the built-in sensor.



For more information and connection details, refer to the “Installation Guide Battery Monitor CAN node” (351507-033) or the system’s quick start guide.

Refer also to the *PowerSuite Help*, for symmetry configuration of *Battery Monitor Control Units*.

Available Inputs and Outputs

Each *Battery Monitor Control Unit* may be equipped with several inputs and outputs that you may use for monitoring and control purposes.

The following inputs and outputs are available to the user:

- 4 Battery Symmetry Inputs
(for batteries)
- 1 Battery Fuse Monitoring Configurable Input
(for battery fuse)

- 1 Battery Current Sense Input
(for current shunts)
- 1 Battery Temperature Sense Inputs
(temperature sensor embedded in the box)

For a complete sorted overview of available inputs and outputs, see “[System Inputs and Outputs - Overview](#)” on page 349.

The Load Monitor Control Unit - Overview

The *Load Monitor Control Unit* is a CAN bus node that enables you to decentralize and increase the number of input fuse monitoring and current sense signals in your DC power supply system.



The fuse monitoring inputs are suitable for monitoring a wide range of breakers in both positive and negative DC distributions.

Available Inputs and Outputs

Each *Load Monitor Control Unit* may be equipped with several inputs and outputs that you may use for monitoring and control purposes.

The following inputs and outputs are available to the user:

- 8 Fuse Monitoring Configurable Inputs
(for load breakers and external equipment)
- 8 Current Sense Inputs
(for load current shunts)

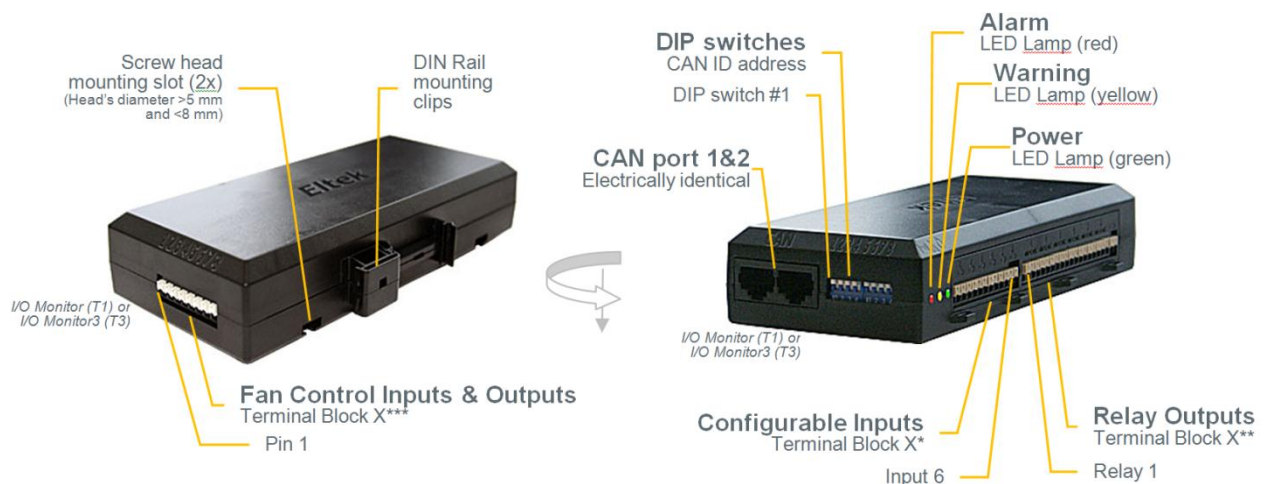
For a complete sorted overview of available inputs and outputs, see “[System Inputs and Outputs - Overview](#)” on page 349.

The I/O Monitor Control Unit (T1) - Overview

Both the *I/O Monitor (T1)* and *I/O Monitor3 (T3)* CAN bus nodes enable you to decentralize and increase the number of input monitoring and output controlling signals in *Eltek's* DC power supply systems.

Also, they can monitor and control the fan speed and compartment temperature inside fan-cooled outdoor cabinets.

The *I/O Monitor3 CAN Bus Node (T3)* is equipped with the same number of input and output signals as the *I/O Monitor (T1)*, but it is specially developed for solar hybrid power systems, with inputs for increased precision of analogue measurements, intended to be used for fuel tank management, solar irradiation, wind measurements, etc.



Available Inputs and Outputs

- 6 Configurable Inputs
(for door, fire, generator switches and other ext. equip.)
- 6 Alarm Relay Outputs
(NC-C-NO; for external alarming purposes)
- 2 OCab Temperature Sense Inputs
(for temperature sensors in Outdoor Cabinets)
- 2 OCab Fan Speed Monitoring Inputs
(for tachometers in Outdoor Cabinets)
- 2 OCab Fan Speed Control Outputs
(for fans in Outdoor Cabinets)

For a complete sorted overview of available inputs and outputs, see [“System Inputs and Outputs - Overview”](#) on page 349.

Climate Control Signals ~ I/O Monitor (T1 and T3)

Both the *I/O Monitor (T1)* and *I/O Monitor3 (T3)* CAN bus nodes are equipped with input and output signals to monitor and control the fan speed and compartment temperature inside fan-cooled outdoor cabinets.

The two inputs “**Temperature Sense 1**” and “**Temperature Sense 2**” are designed to be used with the AD590 series of temperature sensors, e.g. to monitor the temperature inside fan-cooled outdoor cabinets.

The two inputs “**Tachometer Input 1**” and “**Tachometer Input 2**” are developed to monitor the rotational speed of two individual fans. The fan speed is displayed as a percentage of the maximum speed. In order to convert the signal frequency on the tachometer inputs to the correct percentage speed, the inputs must be configured with the number of pulses per revolution (ppr) and with the maximum fan speed (rpm).

The two outputs “**Speed Control Output 1**” and “**Speed Control Output 2**” are designed as Pulse-Width-Modulation (PWM) outputs, to individually control the speed of two independent fans. The outputs can be configured to give a linear control signal from 0V (0% fan speed) to 10V (100% fan speed).

Warning:

To prevent damaging the *I/O Monitor’s* Speed Control Outputs, do not

connect clamping diodes directly on the fans' control inputs. Also, the input impedance of the fans' control inputs must be 10K Ω or greater.

Relays 5 and 6 have higher contacts rating, and are suitable for fan control and other current demanding equipment. For example, they can be used for driving external control relays for switching the fans ON/OFF, instead of using the Speed Control Outputs.

Signal Differences ~ I/O Monitor (T1) vs I/O Monitor3 (T3)

The *I/O Monitor3 CAN Bus Node* (T3) is equipped with the same number of input and output signals as the *I/O Monitor* (T1), but it is specially developed for solar hybrid power systems, with inputs for increased precision of analogue measurements, intended to be used for fuel tank management, solar irradiation, wind measurements, etc.

Input	I/O Monitor (T1)	I/O Monitor3 (T3)
1	Type: NO/NC, Pull Up/Dn, Diode Matrix Range: 0-75V (78mV resolution)	Type: NO/NC, Pull Up/Dn, Diode Matrix Range: 0-75V (78mV resolution)
2	(same as input 1)	(same as input 1)
3	(same as input 1)	Type: NO/NC Range: 0-10V (13mV resolution)
4	(same as input 1)	Type: NO/NC Range: 0-10V (13mV resolution)
5	(same as input 1)	Type: NO/NC Range: 0-10V (13mV resolution) OR 4-20mA (27 μ A resolution)
6	(same as input 1)	Type: NO/NC Range: 0-10V (13mV resolution) OR 4-20mA (27 μ A resolution)

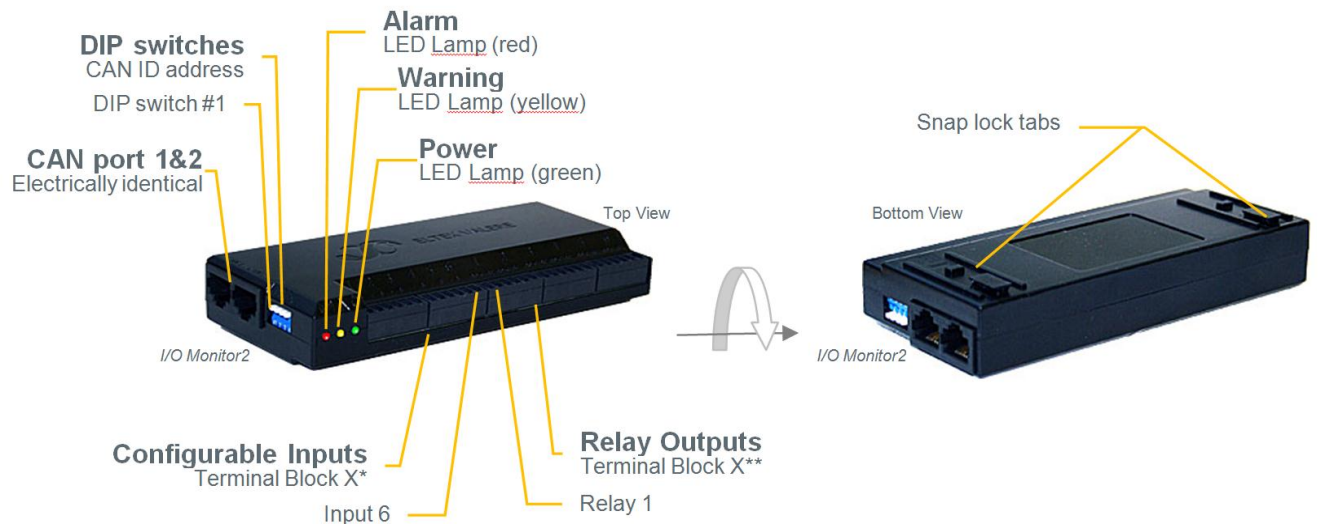
The two inputs “**Config. Input 5**” and “**Config. Input 6**” are designed for accurate analogue current measurements of fuel tank level, wind measurements, etc. But they can also be used for voltage measurements.

The I/O Monitor2 Control Unit (T2) - Overview

The *I/O Monitor2 CAN Bus Node* (T2) is a generic, cost-effective module that enables you to decentralize and increase the number of input monitoring and output controlling signals in *Eltek's* DC power supply systems.

Refer to guide 351509.033 for more description of the *I/O Monitor2 CAN Bus Node* (T2).

Refer to guide 351503.033 for description of the *I/O Monitor* (T1, Outdoor) and the *I/O Monitor3* (T3, Solar Hybrid) CAN bus nodes.



Also, the *I/O Monitor2* is a required component in *Smartpack2*-based power systems.

Available Inputs and Outputs

- 6 Configurable Inputs
(for door, fire, generator switches and other ext. equip.)
- 6 Alarm Relay Outputs
(NC-C-NO; for external alarming purposes)

For a complete sorted overview of available inputs and outputs, see “[System Inputs and Outputs - Overview](#)” on page 349.

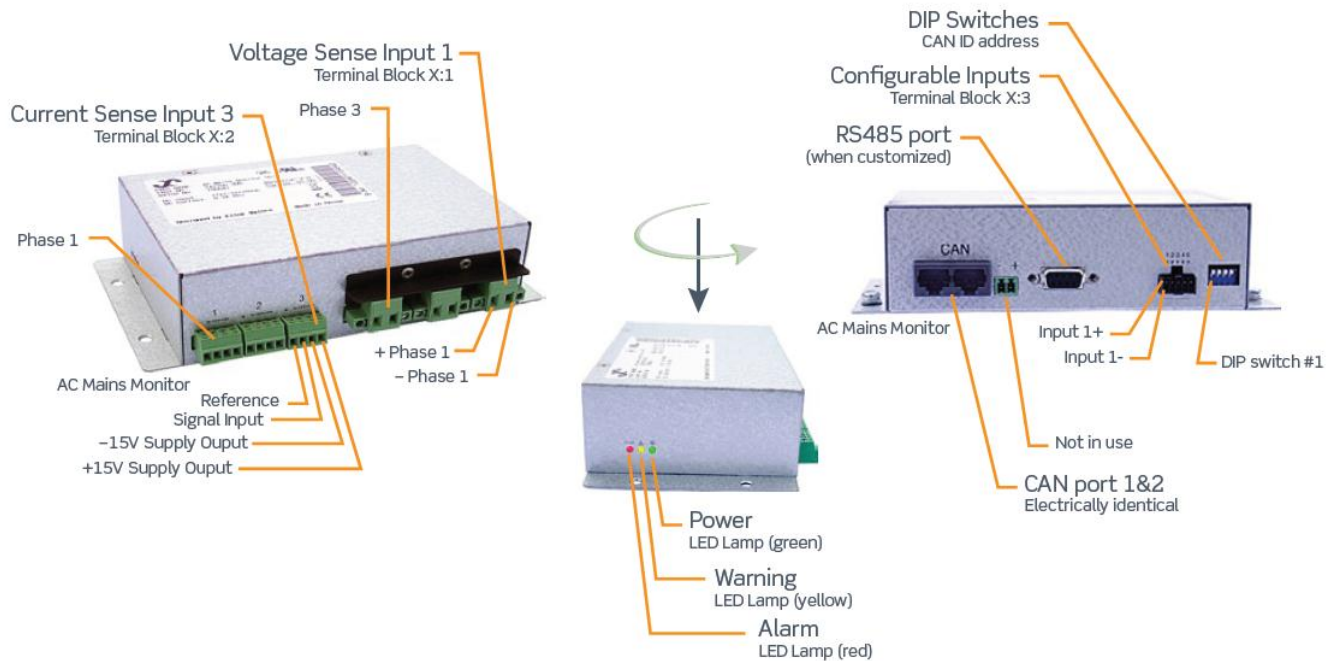
The *I/O Monitor3* Control Unit (T3) - Overview

The *I/O Monitor3* CAN Bus Node (T3) is equipped with the same number of input and output signals as the *I/O Monitor* (T1), but it is specially developed for solar hybrid power systems, with inputs for increased precision of analogue measurements, intended to be used for fuel tank management, solar irradiation, wind measurements, etc.

Read the topic “[The *I/O Monitor* Control Unit \(T1\) - Overview](#)” on page 361.

The *Mains Monitor* Control Unit - Overview

The *AC Mains Monitor* CAN Bus Node enables you to monitor the voltage, current and frequency of each of the phases in the AC mains 3-phase-input of your *Eltek* DC power supply system.



The AC mains status is displayed via LEDs in the monitor's front, and presented in the controller's display. You can configure the *AC Mains Monitor* to generate warnings and alarms based on the measured parameters.

Also, using the browser in your computer, you can access the system's *WebPower* interface, and have remote access to the AC mains measured parameters stored in the *AC Mains Monitor*'s Data Log.

Other logs, like the Mains Outage Log and the Energy Log, will keep track of the total energy consumption and the consumption per phase. The log will present the energy supplied by the mains input every hour, every day and every week, as well as the maximum and minimum values. All the logs may be downloaded to your computer.

The *AC Mains Monitor* three voltage sense inputs may measure AC phase voltages up to 300VAC. The consumed energy calculations are based on a maximum of 200A per phase.

The monitor's three current sense inputs are compatible with either current transducers or current transformers with a maximum signal output level of 4Vp-p (1.4VAC). The *AC Mains Monitor* is also equipped with three +/-15V power outputs to supply the external current transducers.

For monitoring of external devices, such as SPDs or similar, the *AC Mains Monitor* has available 5 configurable digital inputs.

The *AC Mains Monitor* communicates with the power system's controller via the system CAN bus. The monitor is also equipped with an RS485 serial port for communication with external equipment in customized applications.

Available Inputs and Outputs

- 3 AC Voltage Sense Inputs
(for monitoring the voltage of AC mains phases)

- 3 AC Current Sense Input
(for monitoring the current of AC mains phases, via external current transducers or current transformers)
- 5 Configurable Inputs
(for SPD monitoring, generator switches and other external equipment)

For a complete sorted overview of available inputs and outputs, see “[System Inputs and Outputs - Overview](#)” on page 349.

Tutorials

Click on each tutorial topic, to learn about some useful concepts and features to get you configuring your power system as quickly as possible.

How to Configure Alarm Output Groups

Goal:

This tutorial will show you how to configure one of the Alarm Output Groups (AOG) that are usually unassigned from factory.

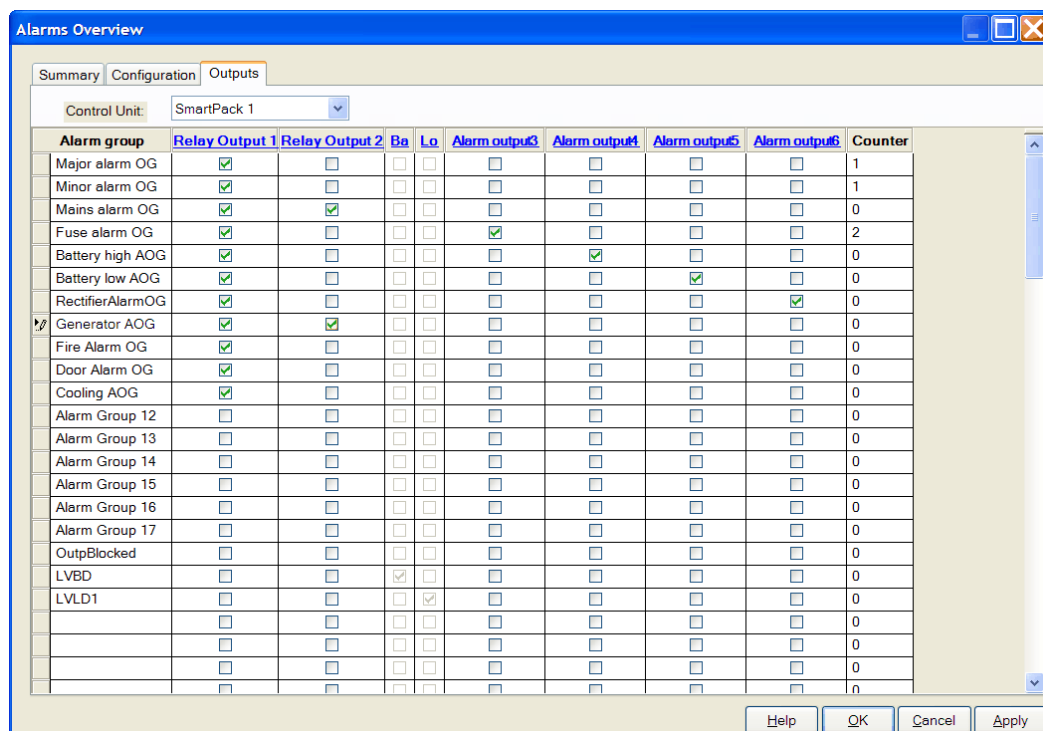
Read more about [Alarm Output Groups](#) (page 328), in the Functionality Description section.

NOTICE: To edit Alarm Output Groups' assignments, you have to be logged in with the Service Access Level password.

Description:

In this tutorial, we want to create an Alarm Output Group with the name of “*Generator AOG*”, and assign alarm relay outputs 1 and 2 to the group. We will use the unassigned Alarm Group 8.

Start by clicking on the “**Alarms Overview**” button, on the toolbar; then click on the “**Outputs**” tab, and finally select the “**Smartpack 1**” control unit, to display the unit’s relay outputs.



To create the Alarm Output Group, perform the following steps:

4. **Edit the group’s name** by, clicking on “*Alarm Group 8*”, on the first column, and change it to “*Generator AOG*”
5. **Assign the alarm relay outputs to the group** by, clicking (checked) on the Relay Output 1 and 2 check boxes, on the same row as “*Generator AOG*”

6. **Save the assignment** by, clicking on the **Apply** and the **OK buttons** to save the assignment

Now when an alarm monitor assigned to the “*Generator AOG*” Alarm Output Group raises an alarm, the alarm relay outputs 1 and 2 will change from open to close or vice versa.

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

How to Configure Alarm Monitors & Programmable Inputs

Goal:

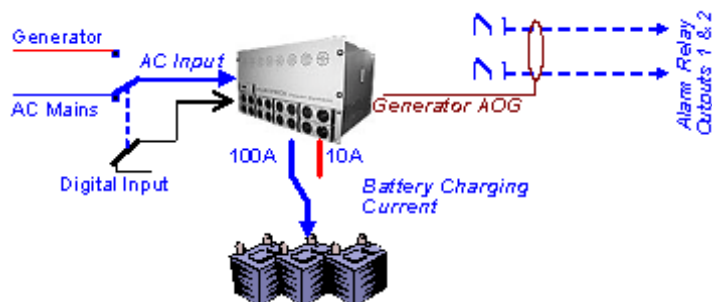
This tutorial will show you how to activate and configure an alarm monitor to check the status of a programmable input, used to monitor an external AC generator. When the AC generator supplies the DC power system, the alarm monitor will limit the battery charging current and activate several alarm output relays.

Read more about [Alarm Monitors](#) (page 324) and [Alarm Output Groups](#) (page 328), in the Functionality Description section.

NOTICE: To configure alarm monitors, you have to be logged in with the Service Access Level password.

Description:

In this tutorial, we want to configure an alarm monitor for programmable input “*ProgInput 1.1*”, to monitor when the AC supply is switched from AC Mains to an external AC generator. Then, when the AC generator is feeding the DC power system, the alarm monitor will limit the system’s battery charging current from 100A to 10A. It will also activate the “*Generator AOG*” Alarm Output Group (alarm relays 1 and 2).



To configure the alarm monitor to function as described, you must perform the following steps:

4. Configure the Alarm Output Group
5. Configure the Battery Charging Current Limitation
6. Configure the Alarm Monitor

For information about how to edit an alphanumeric field or a drop-down list, refer to the Glossary section.

Continue with the tutorial’s “[Step 1 - Configure the Alarm Output Group](#)” on page 369.

Step 1 - Configure the Alarm Output Group

To name an Alarm Output Group as “*Generator AOG*” and configure it to activate relay outputs 1 and 2, read the tutorial “[How to Configure Alarm Output Groups](#)”, page 367.

Continue with the tutorial’s “[Step 2 - Configure the Battery Charging Current Limitation](#)” on page 369.

Step 2 - Configure the Battery Charging Current Limitation

Double-click on the **Battery icon** in the **Power Explorer** pane. Click on the “**Configuration**” tab (A), and on the “**Current Limitation**” tab (B), in the middle of the dialog box.

4. **Enter the Generator Feed charging current limit (C)** by, clicking on the Generator Feed “*Current Limit Value (A)*” text field, to insert the cursor, and then typing <10>.

For information about how to edit an alphanumeric field, refer to the Glossary section.

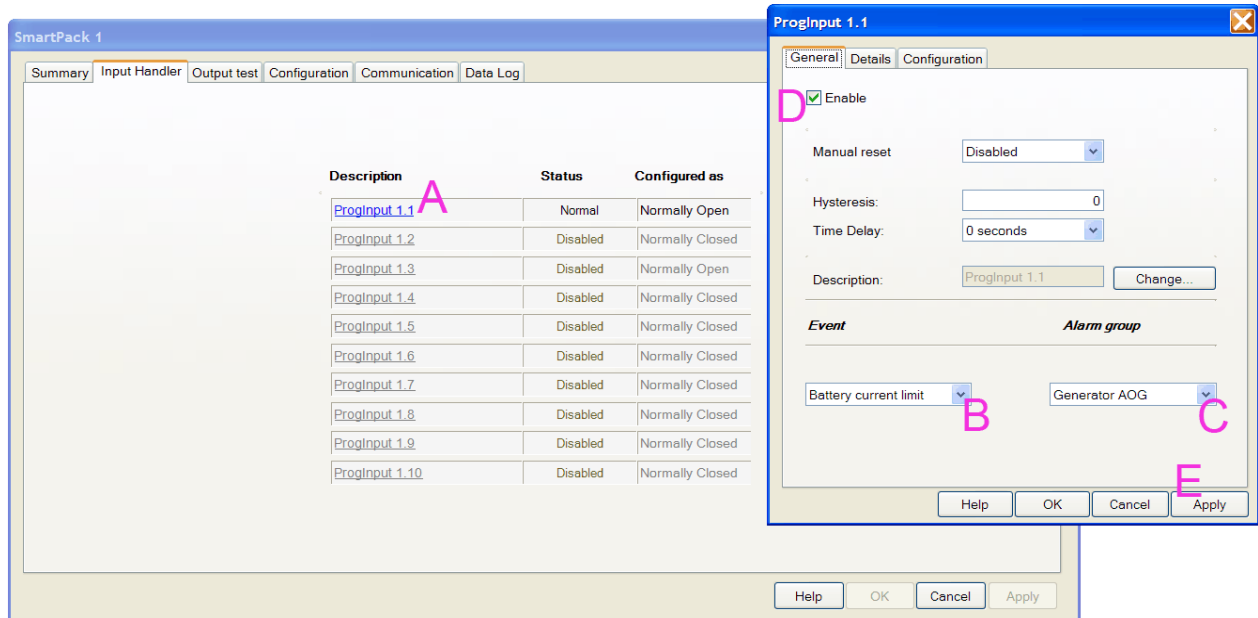
5. **Activate the current limitation (D)** by, clicking on the “Activate” check box, to check it
6. **Save the configuration (E)** by, clicking on the “Apply” button

You find more information about the [Battery Charging Current Limitation](#) (page 317), in the Functionality Description section.

Continue with the tutorial's "[Step 3 - Configure the Alarm Monitor](#)" on page 370.

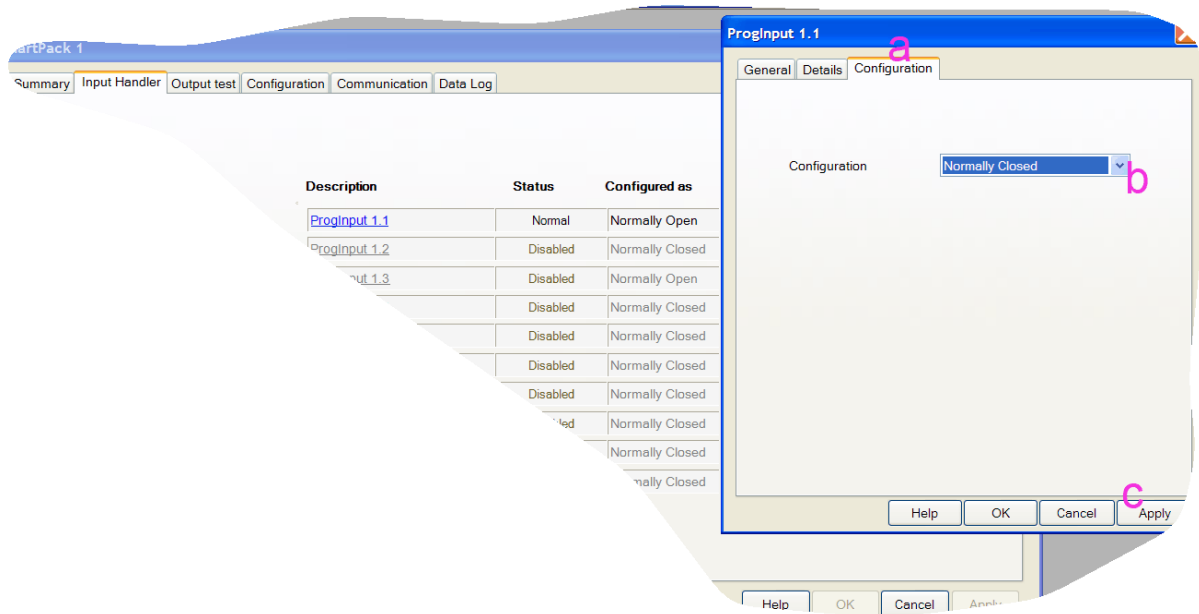
Step 3 - Configure the Alarm Monitor

Double-click the **Control Unit** icon in the **Power Explorer** pane, and then click on the "**Input Handler**" tab.



10. **Open the alarm monitor (A)** by, clicking on the "*ProgInput 1.1*" link (A)
The alarm monitor's dialog box "*ProgInput 1.1*" is displayed
11. **Select the *Battery Current Limit* event (B)** by, clicking on the drop-down arrow (B), and selecting *Battery Current Limit* from the list
12. **Select the *Generator AOG* alarm group (C)** by, clicking on the drop-down arrow, and selecting *Generator AOG* from the list
13. **Activate the alarm monitor (D)** by, clicking on the Enable check box, to check it
14. **Save the alarm monitor configuration (E)** by:
-- Clicking on the Apply button (E)
15. **Save the configuration (H)** by, clicking on the Apply button (H), and close the "*Control Unit 1*" dialog box by clicking on its OK button

AND continue selecting the input's activation pattern, as follows: (see figure below)



16. Click on the **Configuration tab (a)**, and
17. **Select the input's activation pattern by:**
 clicking on the drop-down arrow (b), and select *Normally Closed* (The external relay contacts are closed, and the relay coil energized, when the AC Generator is not supplying the DC power system)
18. Click on the **Apply (c)** and the **OK buttons**

The “*ProgInput 1.1*” alarm monitor link is now active and in blue text.

For information about how to use the drop-down list, refer to the Glossary section.

Now you have configured *PowerSuite* so that when the AC generator supplies the DC power system, the alarm monitor will limit the battery charging current and activate several alarm output relays.

Now you are finished with tutorial “[How to Configure Alarm Monitors & Programmable Inputs](#)” on page 368.

About Eltek

Eltek is a global leader in the development of DC power supply systems, designed to meet the rapid growth within the industrial, solar and telecommunication fields, as well as the increasingly stringent reliability requirements.

www.eltek.com

Energy distribution in industrial, solar, telecommunication and data systems technology require a guaranteed, uninterruptible power supply. To meet this demand, *Eltek* makes in-depth investments in all types of scientific research, technical development, and experimental mathematical modelling of thermal characteristics of components and systems.

Compliance to International Standards

A modern power supply system must fulfil various international standards and regulations, while meeting market requirements. Increased awareness of Electromagnetic Compatibility (EMC), especially in Europe, has resulted in *Eltek's* investment in an EMC test laboratory. This laboratory not only ensures that products comply with relevant standards, it is also utilised throughout product development. The EMC test laboratory forms part of *Eltek's* extensive in-house test facility.

Forefront Telecom Power Products

Electronic equipment for data and telecommunications require supply voltages generated from the mains, as well as from battery-assisted DC voltage. Intensive development work has produced power supply systems designed to meet both current and future power requirements, and the development of control and alarm modules make our power supply systems a market leader. Programmed functions monitor operating conditions, load and battery bank. Whenever a problem is detected, the operator will be notified immediately, either via the telephone network, or via Ethernet. Shutdowns can thus be avoided for critical applications.

Eltek's software expertise is constantly expanding remote communication capabilities of systems, using standard network protocols.

Eltek accepts no responsibility for any damage or injury to the system, site or personnel caused by drawings, instructions or procedures not prepared by *Eltek*.

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FAQs

Frequently Asked Questions, FAQs

In this section you find answers to some of the most Frequently Asked Questions about *Eltek's* DC power systems.

Generic FAQs

PowerSuite and WebPower

Question:

What's the difference between *PowerSuite* and *WebPower*?

Answer:

PowerSuite is a program to be installed and run on a personal computer, while *WebPower* is a graphical user interface (GUI) based on HTML pages that the controller serve to a standard web browser for viewing. No program installation required.

WebPower implements the most common configuration task, while *PowerSuite* enables full configuration of the power system.

Type of Logs

Question:

What's the difference between the types of logs or data records displayed by *Eltek's* power systems, and where do I find them?

Answer:

The control system implements following types of logs:

- **Event Log** (system events)
- **Data Log** (key system data)
- **Data Logging** (key system data)
- **Measurement Logs**
 - Energy Log
 - Load Monitor Energy Log
 - Mains Outage Log
 - Generator Run Hours Log
 - Generator Fuel Consumption Log
 - Battery Discharge Cycles Log

Read more in topic [Types of System Logs](#) (page 230) in the Functionality Description section.

WebPower FAQs

How to Enable Pop-ups in the browser -- Internet Explorer

Question:

How do I enable Pop-ups in the Internet Explorer browser?

Answer:

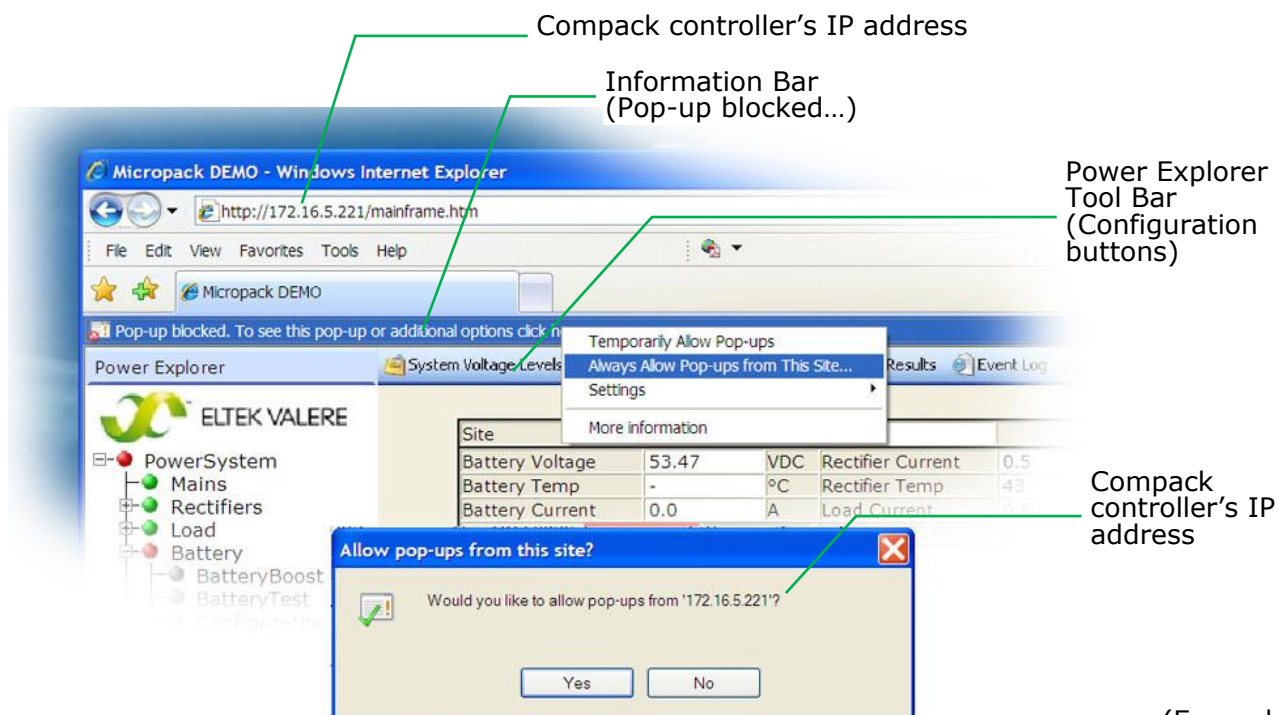
You must allow the Web browser to show pop-ups from the controller's configuration web pages, as the pages' navigation buttons, etc. employ Java script-based navigation.

Internet Explorer and other Web browsers usually have the Pop-Up Blocker feature enabled, thus stopping annoying pop-up ads and pop-up windows while “surfing” the Internet.

This topic explains how to configure the Pop-up Blocker to allow pop-ups from the controller's configuration web pages (e.g. IP address <172.16.5.221>), using Internet Explorer.

Carry out the following steps, if the browser's Information bar displays that the Pop-up Blocker has blocked the page, after clicking on one the buttons on the Power Explorer tool bar:

1. Click on the **Information bar**
2. Select command “**Always Allow Pop-ups from This Site**”, from the drop-down menu
3. Click “**Yes**”, in the “Allow pop-ups from this site?” dialog box



(Example)

How to Change WebPower's Default Log in Passwords

Question:

How do I change the default, factory set user name and password of WebPower's "admin" login account?

If you want to create new User Login Accounts, or edit other registered accounts, then read the topic "[How to Create New User Login Accounts in WebPower](#)" on page 377.

Answer:

To view the controller's configuration pages (GUI) in your Web browser and be able change the "admin" account's user name and password, you have to log in using the "admin" login account.

Following table shows the WebPower's default, factory set User Login Accounts.

Login Account	User Name	Password	Access Level	Note
1	admin	admin	Factory (or ADMIN)	Administration access rights
2	control	control	Service (or CONTROL)	Service access rights
3	status	status	User (or STATUS)	Read only access rights
4	--	--	Factory or Service or User	User defined
--	--	--	Factory or Service or User	User defined
10	--	--	Factory or Service or User	User defined

(Case sensitive passwords)

WARNING: For security reasons, it is advisable to change the default passwords with the passwords of your choice.

Carry out the following steps to change the "admin" account's user name and password:

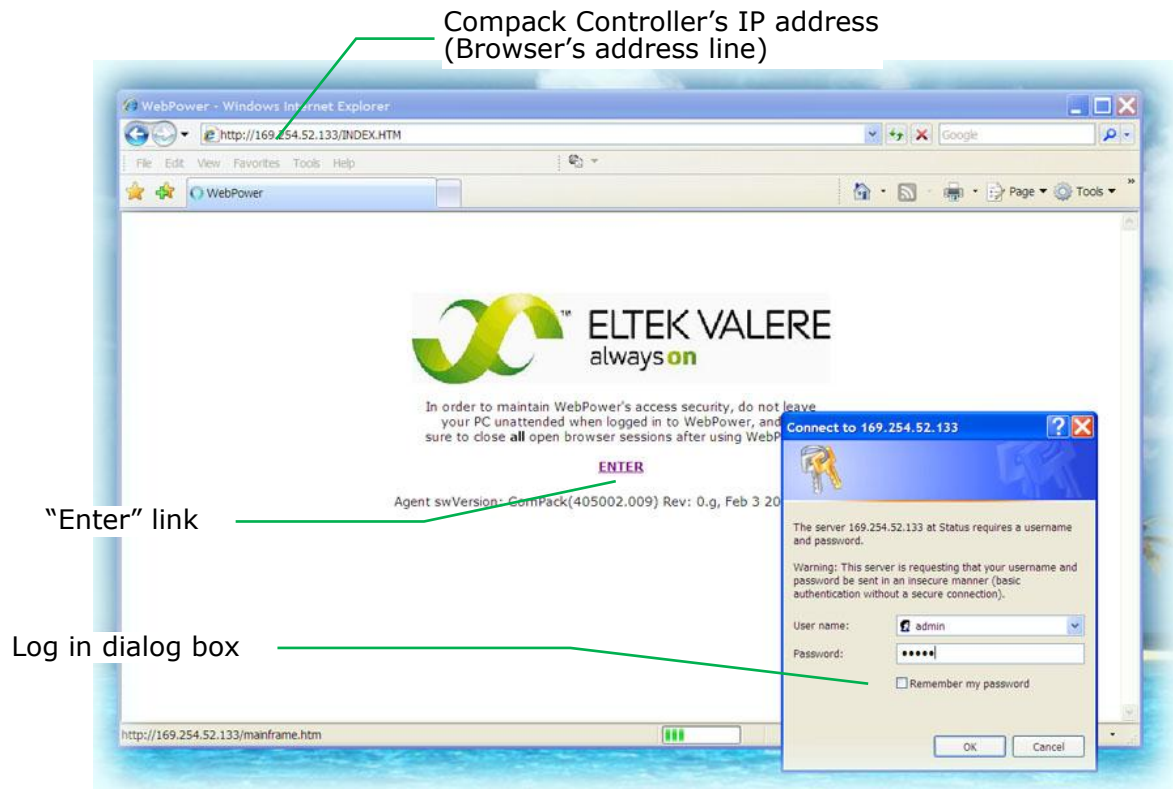
1. Access the controller's configuration pages in your Web browser

by opening your Web browser (e.g. Internet Explorer) and entering the controller's IP address in the browser's address line.

(E.g. <172.16.5.75>; entering "http://" before the address is not necessary).

For more information, read topic [Networking the Controller – Access Methods](#) (page 197) on the Functionality Description section

2. **Log in with the <admin> account,**
by clicking on the “Enter” link — in the Web browser, in the middle of the page — and entering <admin> as user name and <admin> as password (case sensitive).
Or using another login account with Factory Access Level.



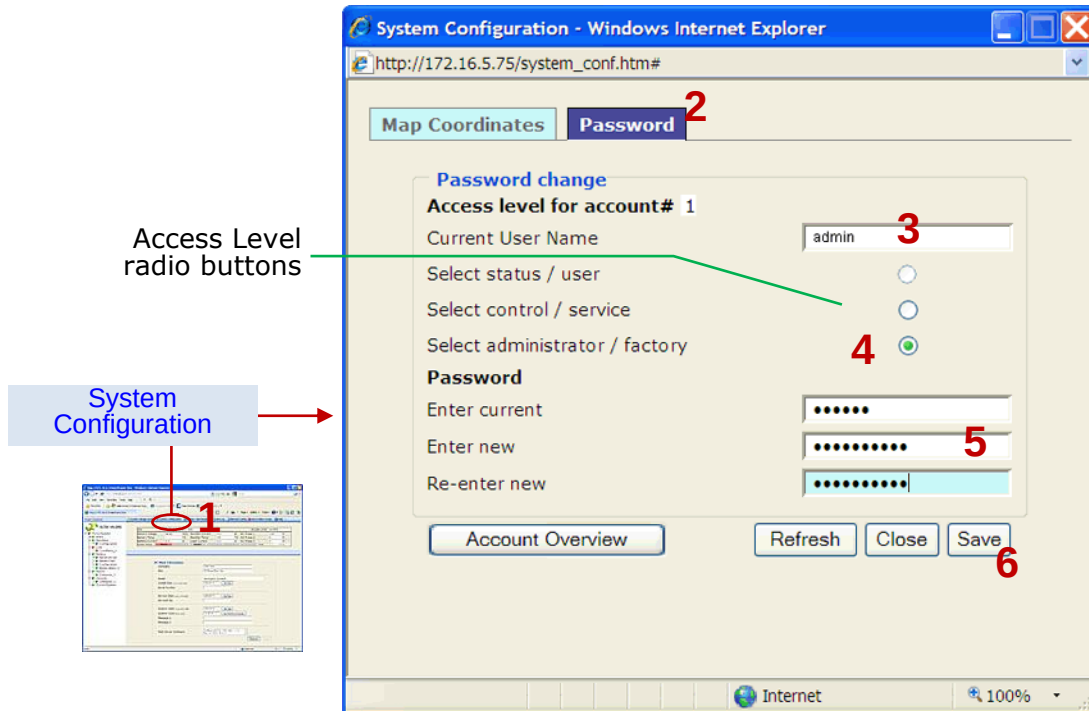
(Example of controller's configuration pages)

Note that the Web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation.

Read the topic "[How to Enable Pop-ups in the browser -- Internet Explorer](#)" on page 374.

3. Change the current user name and password by,

- Clicking on the “System Configuration” button (1), on the Power Explorer toolbar
- Clicking on the “Password” tab (2), in the dialog box
- Clicking in the “Current User Name” field (3), and typing the login account’s new user name
- Selecting the Access Level for the login account; e.g. the “administrator/factory” (4)
- Clicking in the Password fields (5), and typing the login account’s current password (case sensitive) and twice the password you want to change to
- Then clicking on the “Save” button (6), to activate the new password



How to Create New User Login Accounts in WebPower

Question:

How do I create new User Login Accounts in WebPower?

Also, how do I edit existing User Login Accounts in WebPower?

Answer:

To view the controller’s configuration pages (GUI) in your Web browser and be able to create new User Login Accounts or change registered user names and passwords, you have to log in using one of the login accounts with Factory (or ADMIN) Access Level, either the default “admin” account or an already created account with the Factory (or ADMIN) Access Level.

Following table shows the WebPower’s default, factory set User Login Accounts.

Login Account	User Name	Password	Access Level	Note

Login Account	User Name	Password	Access Level	Note
1	admin	admin	Factory (or ADMIN)	Administration access rights
2	control	control	Service (or CONTROL)	Service access rights
3	status	status	User (or STATUS)	Read only access rights
4	--	--	Factory or Service or User	User defined
--	--	--	Factory or Service or User	User defined
10	--	--	Factory or Service or User	User defined

(Case sensitive passwords)

WARNING: For security reasons, it is advisable to change the default passwords with the passwords of your choice.

Carry out the following steps to create a new account, e.g. the unused login account number 4:

1. Access the controller's configuration pages in your Web browser

by opening your Web browser (e.g. Internet Explorer) and entering the controller's IP address in the browser's address line.

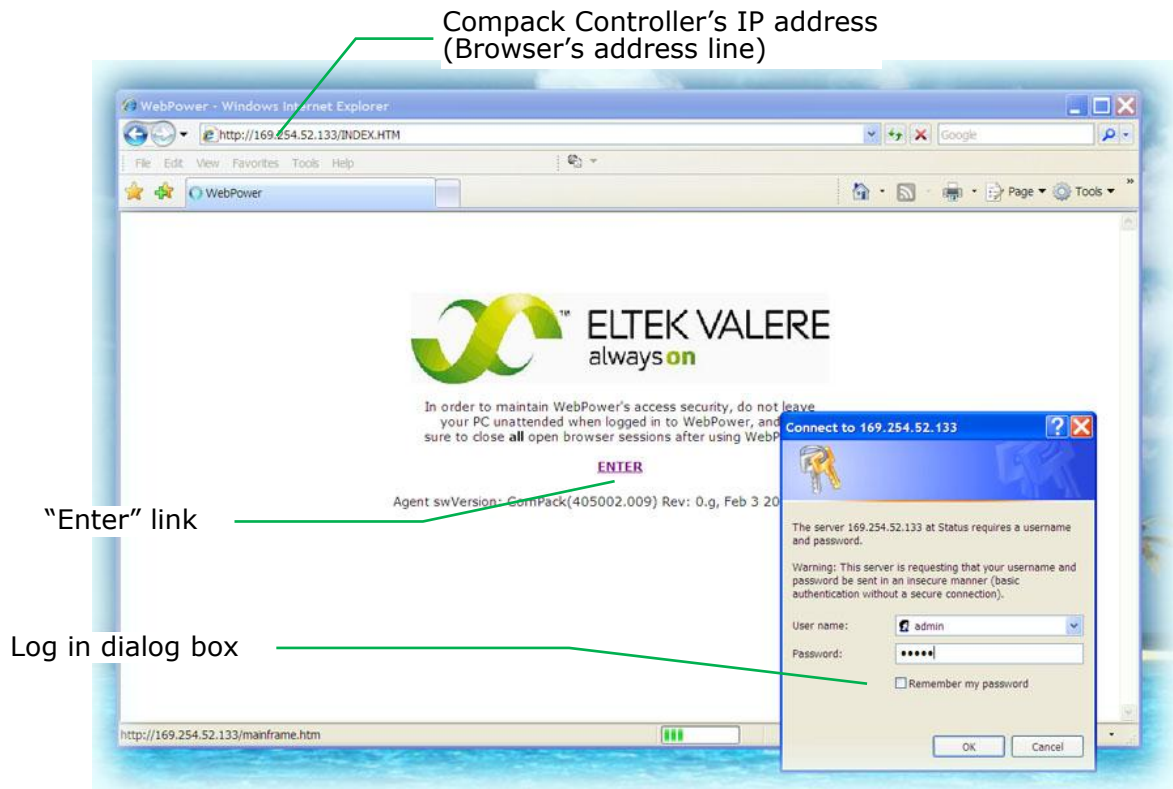
(E.g. <172.16.5.75>; entering "http://" before the address is not necessary).

For more information, read topic [Networking the Controller – Access Methods](#) (page 197) on the Functionality Description section

2. **Log in with the <admin> account,**

by clicking on the “Enter” link — in the Web browser, in the middle of the page — and entering <admin> as user name and <admin> as password (case sensitive).

Or using another login account with Factory Access Level.



(Example of controller's configuration pages)

Note that the Web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation.

Read the topic “[How to Enable Pop-ups in the browser -- Internet Explorer](#)” on page 374.

3. **Create the new Login Account – or edit existing account – by carrying out the following:**

— Click on the “System Configuration” button (1), on the Power Explorer toolbar

— Click on the “Password” tab (2), in the dialog box

(Notice the dialog box shows the access level (4) for the login account you have logged in (3))

— Click in the “Account Overview” button (7),
to open a new dialog box with the overview of registered accounts.

(Notice the “Account Overview” button (7) is not displayed, if you are not logged in with an account with Factory Access Level)

— Click in “Edit” button (8)

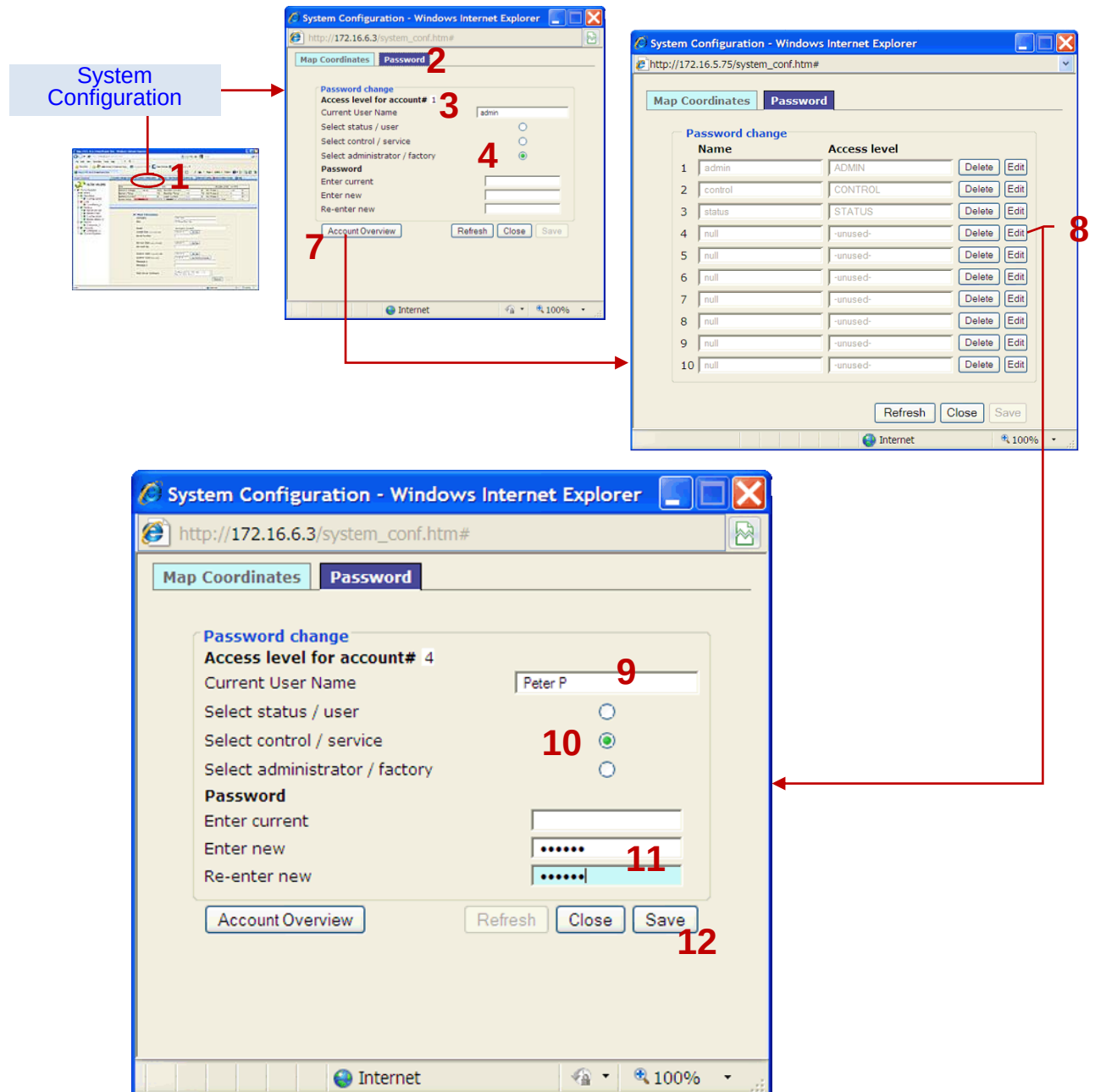
for the unused login account that you want to create, e.g. account 4
or for the existing login account that you want to edit.

(A new dialog box for account # 4 is displayed, so you can enter the login data)

— Click in the Current User Name field (9), and type the user name for the new account,
or edit the name of the existing account.

— Select the radio button for the Access Level for the new login account; e.g. the “control/service” (10)

- Click in the Password fields (11), and type the account's current password (case sensitive) (not necessary, if creating a new account) and twice the new password you want to use for this account,
- Then click on the “Save” button (12), to activate the new login account data.



How to Change the Controller's Device Name

Question:

How do I change the device name of the system controller?

Answer:

In order to facilitate identification of the power system when connected a LAN, it is advisable to log in with the “admin” account and give the system controller a Device name of your choice.

Carry out the following steps to give a Device name to the controller, using the controller’s configuration pages in your Web browser:

- 1. Access the controller’s configuration pages in your Web browser**
by opening your Web browser (e.g. Internet Explorer) and entering the controller’s IP address in the browser’s address line.
(E.g. <169.254.52.133>; entering “http://” before the address is not necessary)
- 2. Log in with the <admin> account,**
by clicking on the “Enter” link — in the Web browser, in the middle of the page — and entering <admin> as user name and <admin> as password (case sensitive) (unless you have previously changed it).

Note that the Web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation.

Read the topic “[How to Enable Pop-ups in the browser -- Internet Explorer](#)” on page 374.

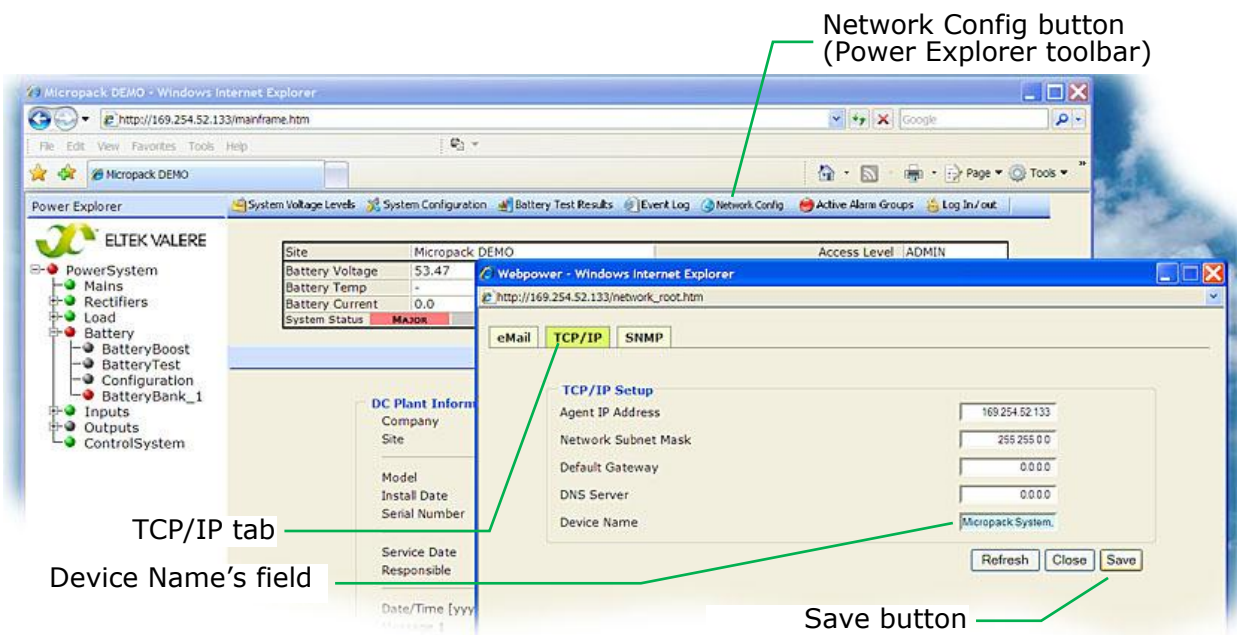
3. Change the controller's Device Name by,

(In SP2WebGUI)

- Clicking on “System Config” icon, in the toolbar
- Clicking on “Network Seeting” in the left command tree, under Device Settings
- Then clicking in the Device Name field and entering the Device Name that describes your power system, e.g. “Micropack System, EV Engine Room, Oslo”

(In WebPower 3 GUI, as shown below)

- Clicking on “Network Config” button, in the Power Explorer's toolbar
- Clicking on the “TCP/IP” tab
- Clicking in the Device Name field and entering the Device Name that describes your power system, e.g. “Micropack System, EV Engine Room, Oslo”
- Then clicking on the “Save” button, to active the controller's new device name



(Example of controller's configuration pages)

Now the *Eltek Network Utility* window will display the new device name.

How to Check or Change the Computer's IP Address

Question:

How to check or change the IP address of your LAN Network Card (NIC), when the computer is running the MS Windows operating system?

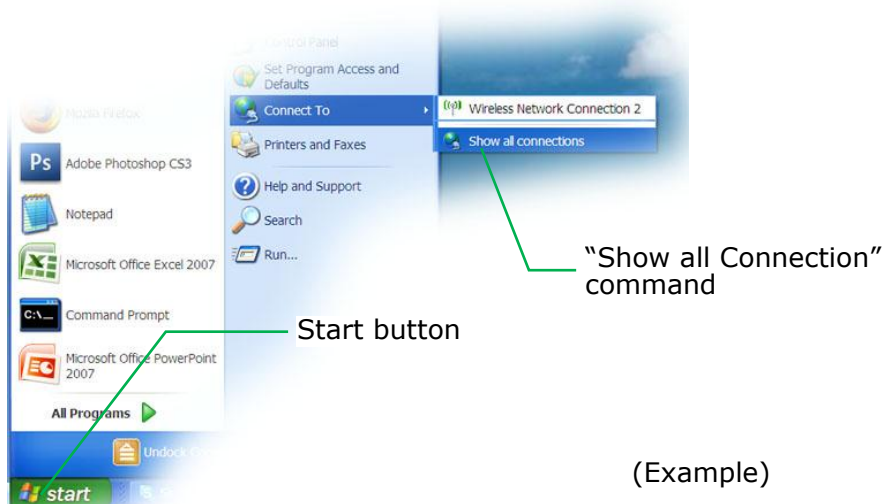
Answer:

In MS Windows, you can always check the IP address, subnet mask, status, etc. of your personal computer's network card (NIC), by opening the “Network Connections” window and looking at the Detail pane on the left side of the window.

Notice that you can also get this information by opening a DOS window and running the command “IPCONFIG”.

Carry out the following steps:

1. **Open the “Network Connections” window by,**
 - Clicking on the “Start” button, and
 - Selecting the options: “Connect To” and “Show all Connections”



OR

If this command is not displayed in the computer’s “Start” menu,

- Clicking on the “Start” button, and
 - Selecting the “Control Panel”
 - Clicking on the “Network Connections” icon
- that opens the computer’s Network Connections window

2. Find the NIC's IP address and subnet mask used by the computer by,—
— Selecting the actual network card (NIC),
e.g. "Local Area Connection 3"

— Making a note of the IP address and Subnet mask displayed in the Details panel, on the left side of the window.
E.g. IP address: <172.16.5.192>, Subnet mask: <255.255.252.0>

The screenshot shows the Windows Network Connections window. The 'Network Tasks' pane on the left includes options like 'Create a new connection', 'Change Windows Firewall settings', and 'Repair this connection'. The 'Details' pane on the left shows the selected network card, 'Local Area Connection 3', with its IP address (172.16.5.192) and Subnet Mask (255.255.252.0). The 'Folders' button on the toolbar is highlighted. The 'Local Area Connection 3 Properties' dialog box is open, showing the 'Internet Protocol (TCP/IP)' tab. The 'Obtain an IP address automatically' option is selected. The 'Internet Protocol (TCP/IP) Properties' dialog box is also open, showing the 'General' tab. The 'Obtain an IP address automatically' option is selected. The 'Obtain an IP address automatically' option is selected.

"Network Connection" window

"Folders" button

Selected Network card (NIC) (Local Area Connection 3)

The "Details" pane shows the NIC's IP address, etc

Write click on the "Local Area Connection 3" and select "Properties" to open the dialog box.

Click on the "Internet Protocol (TCP/IP)" and on the "Properties" button to open the next dialog box.

The NIC's DHCP is enabled: "Obtain an IP address automatically"

"Details" pane, showing IP address, etc (If this pane is not displayed, click on the "Folders" button, on the toolbar, to display it)

(Example)

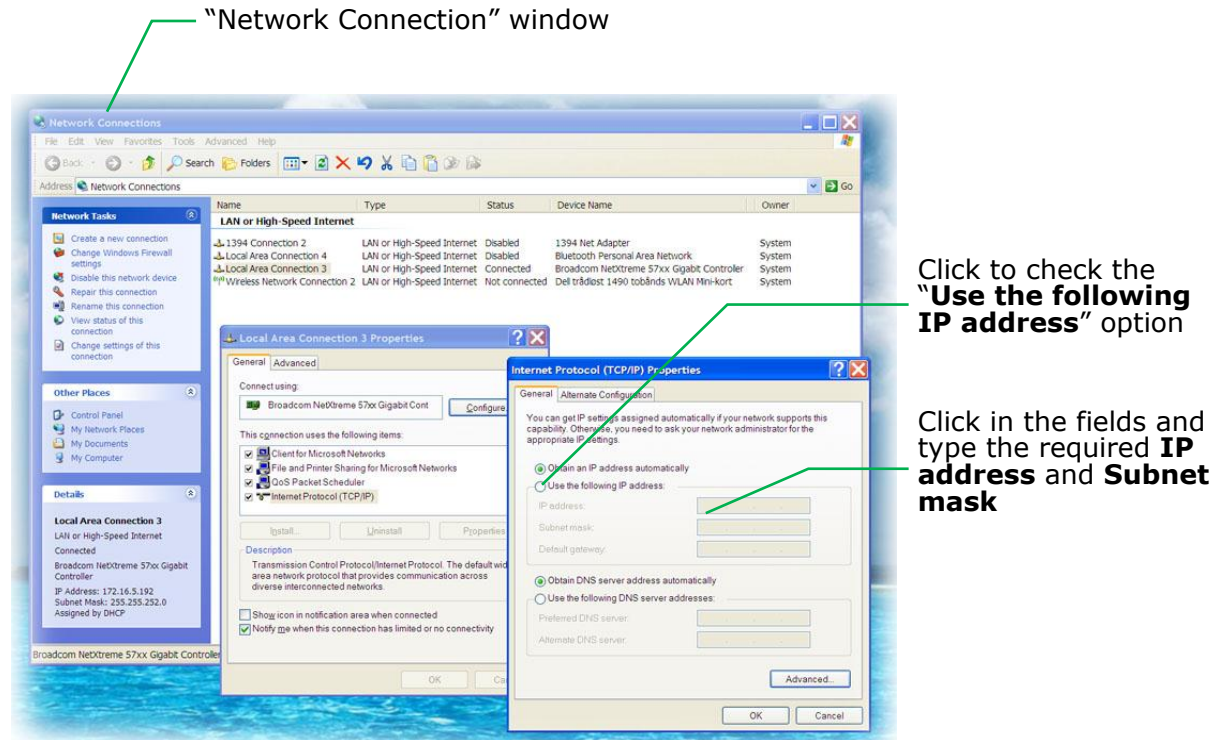
3. **If you need to change the NIC's IP address and subnet mask used by the computer, do following:**

- Click on the “Use the following IP address” radio button to activate it
- Click in the IP address field, and enter the required IP address

e.g. <169.254.52.132>

- Click in the Subnet mask field, and enter the required subnet mask

e.g. <255.255.255.0>



(Example)

NOTICE:

You might need to change the IP address of your computer, for example if you want to connect the computer to a controller or network device with fixed IP address.

WARNING!

Never enter Network Mask (Subnet masks) <0.0.0.0> or <255.255.255.255> as they are not valid masks, and in the worst case may render the controller or LAN device inaccessible.

PowerSuite FAQs

Cannot Find the Com Port Number

Question:

Why clicking on the “Find COM Port #” button does not display the COM port number?

You find the “Find COM Port #” button on dialog box [Site Manager dialog box](#) (page 45) in *PowerSuite* Online Help.

Answer:

If the COM port number is not displayed when you click on the “Find COM Port #” button, the reason could be that the *Smartpack* USB drivers were not installed in the PC during the *PowerSuite* program installation, or were installed incorrectly.

To install the *Smartpack* USB drivers correctly follow the steps in the topic [2. Switch the Smartpack ON and connect the USB cable](#) (page 5) in *PowerSuite* Online Help.

Glossary of Terms

2AC Power Shelves

2AC Power Shelves (Dual AC feed: 2 AC inputs per shelf, each feeding 2 rectifiers)

4AC Power Shelves

4AC Power Shelves (Single AC feed: 4 AC inputs per shelf, each feeding 1 rectifier)

AC

Alternating current (AC) is the electric current whose magnitude and direction vary cyclically with time.

AFC

Available Fault Current (AFC): The current that flows in a circuit if a short-circuit of negligible impedance were to occur at a given point

Alarm Monitor

Alarm monitors are software modules used by the controller to **measure system internal and external input signals or logical states**.

When an alarm monitor is enabled, it **compares the measured parameter with pre-programmed values or limits**, and raises an alarm in the event of the measured parameter reaching one of the limits.

When this event occurs, the alarm monitor stores the event in the Event Log, initiates an internal action and activates an output group (AOG).

PowerSuite uses 3 types of alarm monitors:

Analogue Alarm Monitors (usually measure voltage or other analogue input signals),

Numeric Alarm Monitors (count the number of AC phases, rectifiers or other integers) and

Logical Alarm Monitors (report the state of relay contacts, open or close, or other similar status)

Read topic Alarm Monitor in *PowerSuite* Help section, to find out how to interact with alarm monitor dialogue boxes in *PowerSuite*.

Read more about [Alarm Monitors](#) (page 324) in the Functionality Description section.

Alarm Monitors

See Alarm monitor

Alarm Output Group

An Alarm Output Group (AOG) is a user defined software assignment that consists of grouping together all the outputs -- alarm relay outputs and or contactors (LVLD and LVBD); telephone numbers (*Smartnode*) -- that always are activated at the same time.

In order to activate the alarm relay outputs, contactors (LVLD and LVBD) or telephone numbers in the DC power supply system, you have to assign them to output groups.

Output relay assignment and output relay mapping are similar terms, synonyms.

Read more about [Alarm Output Groups](#) (page 328) in the Functionality Description section.

Alarm Output Groups

See Alarm Output Group

Alarm State

The state of a voltage output or the position of alarm relay contacts when the output is NOT in normal condition (the output is activated).

Alphanumeric Field

In standard Windows interface, alphanumeric fields in dialogue boxes are areas that contain text strings or numeric values that the user may change.

Do following to edit the text strings or numeric values in alphanumeric fields:

1. **Click inside the field**, to insert the cursor in the text or value.
Use your keyboard's arrow keys to reposition the cursor
2. Use the keyboard's **standard editing keys** (Delete, Backspace and typing keys) to edit the text or value
Press the ESC key or click on the dialog box's Cancel button or Close  button, if you want to discard the edited changes.
3. Click on the **Apply button**, in the dialogue box, to save the changes

Accepting or Rejecting Entered Data

In standard dialog boxes, clicking on the **Apply** or the **OK buttons** will activate the parameters and data you entered or selected in the box's fields.

Clicking on the **Cancel button** or the **Close button** – the cross, in the dialog box's title bar – will close the dialog box, and all parameters and data you may have selected in the box's fields will be rejected.

Allowed range of values

If you enter values outside a field's allowed range, a **red balloon with an exclamation mark** will appear by the field.

Use the mouse to **point at the exclamation mark**, and a tool tips text box will indicate the field's allowed range.

Alphanumeric Fields

See Alphanumeric field

Ampacity

Ampacity is the maximum amount of electrical current a conductor or device can carry before sustaining immediate or progressive deterioration. Also described as **current rating** or current-carrying capacity, ampacity is the RMS electric current which a device can continuously carry while remaining within its temperature rating.

Ampere-hours (Ah)

A measure of energy that is provided to or drawn from a battery. (A current of one ampere for one hour equals 1Ah).

Amp-Hour Battery Rating

This is the common rating of a battery. Amp-hour rating of battery capacity is calculated by multiplying the current (in amperes) by discharge time (in hours). Amp-hour battery rating is commonly used when describing sealed lead acid batteries used in Telecom and UPS systems.

For example: a battery which delivers 2 amperes for 20 hours would have a 40 amp-hour battery rating ($2 * 20 = 40$).

Battery Block

Consist of two or more battery cells connected together. Usually, the battery block consists of a “physical” battery pack, commonly called a “battery”.

Read more about [Battery Functions](#) (page 294) in the Functionality Description section.

Battery Boost Charging

Battery Boost Charging or Equalized Charging is a fast charge technique used to reduce recharge time for the batteries and equalize the voltage between individual cells.

The boost charging voltage should always be higher than the float voltage and lower than the OVP voltage.

If a reduction in recharge time is required, starting boost charging will increase the charge voltage and current.

Read more about [Battery Functions](#) (page 294) in the Functionality Description section.

Battery Capacity

By accepted convention worldwide, it is described in "AMPERE HOUR" at the 10-hour rate C10 when discharged at 25°C.

i.e.: a battery is 200 Ah at C10, that is the battery will deliver 20 amps current for 10 hours to a cut off voltage of for example 1.80 volts per cell.

Battery capacity is affected by the discharge rate, end-voltage, temperature and age.

Read more about [Battery Functions](#) (page 294) in the Functionality Description section.

Battery Cell

An electrochemical system that converts chemical energy into electrical energy.

Read more about [Battery Functions](#) (page 294) in the Functionality Description section.

Battery Cut-off Voltage

Battery Cut-off Voltage is the volts-per-cell to which a battery may be discharged safely to maximize battery life.

This data is specified according to the actual discharge load and run time. As a rule of thumb, high amp loads and short run times will tolerate a lower cut off voltage, whereas a low amps long run time discharge will require a higher cut off voltage.

Read more about [Battery Functions](#) (page 294) in the Functionality Description section.

Battery Cycle

A full charge followed by a full discharge (or the other way around). Cycle life is measured by the amount of times a battery may be charged and discharged. Every time a battery is charged and discharged, it uses one cycle. Cycle life is very important in battery applications such as laptop batteries and emergency light batteries. A NiCad battery has a cycle life of 500-1000 or more cycles.

Read more about [Battery Functions](#) (page 294) in the Functionality Description section.

Battery Definition Table

It is also called Discharge Table, which indicates a battery's constant current discharge performance data.

A battery model for Telecom applications can be selected by referring to a constant current discharge table for a specific period of time, to a specified end-of-discharge voltage and temperature.

Battery Discharge Characteristic

The discharge capacity of a lead acid battery varies, and is dependant on the discharge current.

A battery could use a rate at the 10 hour rate. i.e. the capacity of the battery at 10 hours discharged to an end voltage of 1.80 Vpc (volts per cell) at a temperature of 25°C.

Battery Float Voltage

A constant voltage applied to a battery to maintain the battery capacity.

Read more about [Battery Functions](#) (page 294) in the Functionality Description section.

Boost Mode

Boost Mode is one of the PowerSuite's operation modes, where the rectifiers charge the batteries much faster than while in Float Mode.

Boost Voltage

Indicates the output voltage during fast battery recharge (battery boost charging). Increased charge voltage will reduce the required recharge time.

Branch Circuit

A branch circuit consists of the conductors and components following the last overcurrent protective device protecting a load.

Branch Circuit Protection: Overcurrent protection with an ampere rating selected to protect the branch circuit.

Branch Circuit Protective Device: A fuse or circuit breaker that has been evaluated to a safety standard for providing overcurrent protection.

Supplementary Protection: A device, typically either a supplementary fuse or a supplementary protector, intended to provide additional protection subsequent to branch circuit protection. This device has not been evaluated for providing branch circuit protection. The purpose of supplementary protection is to provide additional protection for a given piece of electrical equipment - *it does not serve as branch circuit protection*. Supplementary protection can be provided by fuse (rated as supplementary protection) or by a supplementary protector.

Supplementary Protector: A manually resettable device designed to open the circuit automatically on a pre-determined value of time versus current or voltage, within an appliance or other electrical equipment. It may also be provided with manual means for opening or closing the circuit. A supplementary protector's primary function is to protect equipment. Supplementary protectors *can be applied at 100% of the rated current values, in contrast with branch circuit breaker which are applied at 80% of the rated current value*, unless marked differently on the device.

Browser

Short for Web browser, a software application used to locate and display Web pages. The two most popular browsers are Microsoft Internet Explorer and Mozilla Firefox. Both of these are graphical browsers, meaning that they can display graphics as well as text. In addition, most modern browsers can present multimedia information, including sound and video, though they require plug-ins for some formats.

The *WebPower* firmware is tested and approved for MS Windows with the latest versions of the following Web browsers: Microsoft Internet Explorer and Mozilla Firefox. Other browsers and operating systems may also be used, though faultless behavior cannot be guaranteed.

CAN Bus

Controller Area Network (CAN or CAN bus) is a serial protocol utilized for communication between *Eltek's* rectifiers, controllers and other control units.

The CAN bus standard was originally designed to allow microcontrollers and devices to communicate with each other without a host computer.

The CAN specification defines the Data Link Layer, while ISO 11898 defines the Physical Layer.

The CAN bus is a 2-wire interface running over either a Shielded Twisted Pair (STP), Un-shielded Twisted Pair (UTP), or Ribbon cable. Each node uses a Male 9-pin D connector.

Capacity

The electrical energy content of a battery as expressed in ampere-hours (Ah). Capacity is the total number of ampere-hours or watt-hours that can be withdrawn from a fully charged cell or battery under specific condition of discharge.

The capacity is measured by observing the time it takes to discharge a battery at a constant current until a specified cut-off voltage is reached. This capacity in Ah indicates how good the battery condition is.

See also “ [d2h_bmk_Ref228001623_615](#)” on page **Error! Bookmark not defined.**

CEC

Canadian Electric Code (CEC), in Canada

Cell mismatch

Cells within a battery pack containing different capacity and voltage levels.

Cell reversal

The stronger cells of a battery (several cells connected in series) impose a voltage of reverse polarity across a weaker cell during a deep discharge.

Charge

The process of replenishing or replacing the electrical charge in a rechargeable cell or battery.

Circuit Breaker

A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit.

Its basic function is to detect a fault condition and, by interrupting continuity, to immediately discontinue electrical flow. Unlike a fuse, which operates once and then has to be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation.

Compact

A versatile microprocessor based controller for monitoring *Micropack* DC power supply systems. The controller is designed for DIN rail mounting.

Control Unit

See Control Units.

Control Units

The control system -- in *Eltek* DC power systems -- consists of control units or hardware devices connected to the system's CAN bus.

Several types of control units may be connected, such as:

- *Smartpack2 Master* controllers
- *Smartpack2 Basic* controllers
- *Smartpack* controllers
- *Compact* controllers

- Smartnode control units
- Battery Monitor units
- Load Monitor units
- I/O Monitor units
- I/O Monitor2 units
- Mains Monitor units
- Other control units or CAN nodes

Controller

A generic expression for one of the power system's microcontrollers:
Smartpack2 Master, Smartpack2 Basic, Smartpack or Compack controllers.

Controllers

See Controller

C-rate

Unit by which charge and discharge times are scaled. A battery rated at 1000mAh provides 1000mA for one hour if discharged at 1C. A discharge of 1C draws a current equal to the rated capacity. The same battery discharged at 0.5C would provide 500mA for two hours.

Critical Condition

A DC power system's state caused when one or several serious circumstances occur. Usually, the DC power supply system is in *critical condition* when the battery bank is the only supply source (negative battery current).

Using *PowerSuite*, you can configure which circumstances (monitors in alarm) the DC power system has to encounter for the system to be in *critical condition*.

Crossover Cable

An Ethernet crossover cable is a type of Ethernet cable used to connect computing devices together directly where they would normally be connected via a network switch, hub or router, such as directly connecting two personal computers via their network adapters.

The 10BASE-T and 100BASE-TX Ethernet standards use one wire pair for transmission in each direction. The Tx+ line from each device connects to the tip conductor, and the Tx- line is connected to the ring. This requires that the transmit pair of each device be connected to the receive pair of the device on the other end. When a terminal device is connected to a switch or hub, this crossover is done internally in the switch or hub. A standard straight through cable is used for this purpose where each pin of the connector on one end is connected to the corresponding pin on the other connector.

Current-limiting chargers

A charger that keeps the charge current constant during the charge process but allows the voltage to fluctuate.

Cycle life

The number of cycles a battery provides before it is no longer usable. (A battery is considered non-usable if its nominal capacity falls below 60 to 80 percent).

A battery cycle is one complete discharge and recharge cycle. It is usually considered to be discharging from 100% to 20% of full charge (**80% DOD or conversely 20% SOC**), and then back to 100%.

Battery life is directly related to how deep the battery is cycled each time. If a battery is discharged to 50% DOD every day, it will last about twice as long as if it is cycled to 80% DOD. If cycled only 10% DOD, it will last about 5 times as long as one cycled to 50%.

The **State of Health, SOH**, is a "measurement" that reflects the general condition of a battery and its ability to deliver the specified performance compared with a full charged battery. It takes into account such factors as charge acceptance, internal resistance, voltage and self-discharge.

During the lifetime of a battery, its performance or "health" tends to deteriorate gradually due to irreversible physical and chemical changes which take place with usage and with age until eventually the battery is no longer usable or dead.

The SOH is an indication of the point which has been reached in the life cycle of the battery and a measure of its condition relative to a full charged battery.

The system battery's quality and total capacity (SOH) are measured by alarm monitors "BatteryQuality" and "BatteryTotCap". These alarm monitors are used when battery testing against the "Current Ref 1" parameters in the battery definition tables. Alarm monitor "**BatteryUsedCap**" **measures the DOD**.

DC

Direct current (DC) is the constant flow of electric charge with constant polarity.

The electric charges flow in the same direction, distinguishing it from alternating current (AC)

DC Power Supply Systems

Eltek's modern ranges of DC power supply systems using the **Smartpack2**, the **Smartpack** and or the **Compack** as system controllers. The ranges cover integrated, cabinetized and outdoor system solutions.

The **Smartpack2-based systems'** building blocks consist of the *Smartpack2 Master* controller, the *Smartpack2 Basic* controller, the *I/O Monitor2* unit and *Flatpack2* rectifiers as their building blocks.

The **Smartpack-based systems** use the *Smartpack* controller and *Minipack* rectifiers, *Flatpack2* rectifiers or *Powerpack* three-phase rectifier modules as their building blocks.

The **Compack-based systems** use the *Compack* controller, *Micropack* rectifiers and Battery and Load Distribution modules as their building blocks.

In addition to these modules, the systems incorporate AC distribution for the rectifier inputs and DC distribution, batteries, LVD options, etc.

All the *Micropack* building blocks are designed for DIN rail mounting.

DC Power System

See DC Power Supply Systems

DC Power Systems

See DC Power Supply Systems

Delta Voltage

Delta voltage is an absolute calculated value that represents how well balanced the battery blocks that form a string are. PowerSuite uses this expression when calculating battery symmetry.

Delta voltage (Vdelta) is the difference between the calculated and the measured voltages, e.g. $(V_{\text{battery}} / 2) - V_{\text{measured}} = |V_{\text{delta}}|$

A Delta voltage of 0V indicates a completely balanced battery string.

DHCP

Dynamic Host Configuration Protocol (DHCP) is a network application protocol used by devices (DHCP clients) to obtain configuration information for operation in an Internet Protocol network. This protocol reduces system administration workload, allowing devices to be added to the network with little or no manual intervention.

DOD

Depth of Discharge; See Cycle life

Drop-down List

In standard Windows interface, a drop-down list in a dialogue box is a field containing a down-arrow button at the field's right side, which displays a list of text strings or numeric values that the user may select from.

When the list is up, the field displays the selected value.

Do following to select values form the drop-down list:

1. **Click on the down-arrow button**, to display the list with available values
2. If the list is longer than displayed, **click on the list's scroll bar buttons** (up or down buttons) to find the value you want to select
3. **Click on the value you want to select.**
The drop-down list disappears and the selected value is displayed

Accepting or Rejecting Entered Data

In standard dialog boxes, clicking on the **Apply** or the **OK buttons** will activate the parameters and data you entered or selected in the box's fields.

Clicking on the **Cancel button** or the **Close button** – the cross, in the dialog box's title bar – will close the dialog box, and all parameters and data you may have selected in the box's fields will be rejected.

Drop-down Lists

See Drop-down List

Earthing System

In electricity supply networks, an earthing system defines the **electrical potential of the conductors relative to that of the Earth's conductive surface.**

The choice of earthing system has implications for the safety and electromagnetic compatibility of the power supply. Regulations for earthing (grounding) systems vary considerably among different countries.

A **protective earth (PE)** connection ensures that all **exposed conductive surfaces are at the same electrical potential as the surface of the Earth**, to avoid the risk of electrical shock if a person touches a device in which an insulation fault has occurred. It ensures that -- in the case of an insulation fault (a "short circuit")-- a very high current flows, thus triggering an over-current protection device (fuse, circuit breaker) that disconnects the power supply.

A **functional earth** connection serves a purpose other than providing protection against electrical shock. In contrast to a protective earth connection, a functional earth connection may carry a current during the normal operation of a device.

Functional earth connections may be required by devices such as surge suppression and electromagnetic interference filters, some types of antennas and various measurement instruments. Generally the protective earth is also used as a functional earth, though this requires care in some situations

Eltek

Eltek is a global corporation that secures worldwide communication by providing critical power solutions for telecom infrastructure, as well as for industrial and solar applications.

Eltek Network Utility

Simple Windows-based utility program (EVIPSetup.exe) that needs no software installation

It is used to display the controller's network parameters, when connected to an Ethernet LAN.

Also, it enables changing the controller's IP address, configuring the controller via a standard Web browser and upgrading the controller's firmware.

End-of-Discharge Voltage

The voltage point to which a battery can be discharged is a function of the discharge rate. The Recommended End-Voltage Point (REVP) is the voltage at which a battery should be disconnected from the load.

Discharging the battery below the REVP, or leaving the battery connected to a load in a discharged state will "over-discharge" the battery, and may impair its ability to accept charge.

Energy

Voltage multiplied by current expressed in watts.

Equalizing Charge

With time, the charge levels of individual cells of a large battery tend to become slightly unbalanced. The equalizing charge applies an elevated charge voltage for a few hours to balance the cells. Used mainly for large lead acid cells.

Ethernet

Local Area Network technology. Ethernet provides data transfer using a baseband (single-channel) communication technique. Ethernet uses carrier sense

multiple access collision detection (CSMA/CD) that prevents network failures when two devices attempt to access the network at the same time. A 10/100 Ethernet port supports 10BASE-T and 100BASE-TX.

See also Ethernet, more...

Ethernet, more...

Ethernet is a large, diverse family of frame-based computer networking technologies that operates at many speeds for local area networks (LANs).

It defines a number of wiring and signaling standards for the physical layer, through means of network access at the Media Access Control (MAC)/Data Link Layer, and a common addressing format.

Ethernet has been standardized as IEEE 802.3. The combination of the twisted pair versions of Ethernet for connecting end systems to the network with the fiber optic versions for site backbones become the most widespread wired LAN technology in use from the 1990s to the present, largely replacing competing LAN standards such as coaxial cable Ethernet, token ring, FDDI, and ARCNET.

In recent years, Wi-Fi, the wireless LAN standardized by IEEE 802.11, has been used instead of Ethernet for many home and small office networks and in addition to Ethernet in larger installations.

Event

See Events

Events

In *Eltek* DC power systems, events are system internal actions used by the controller's alarm monitors.

Alarm monitors measure system internal and external input signals or logical states, and compare the measured parameter with pre-programmed values or limits. The alarm monitors raise an alarm **in the event of the measured parameter reaching one of the limits**.

EVIPSetup.exe

See *Eltek Network Utility Program*

Firmware

Firmware is software stored permanently on ROM or PROM chips. It can also be electrically erased and reprogrammed (flashed) when stored in EEPROM chips.

Flatpack

Eltek's range of *Flatpack* rectifiers used in *Flatpack* DC power supply systems. The systems use the *MCU* controller and *Flatpack* rectifiers as their building blocks. Though the range has been installed worldwide in a variety of system solutions, and it is now replaced by the compact *Flatpack2* range.

Flatpack2

Eltek's modern of *Flatpack2* rectifiers used in *Flatpack2* DC power supply systems. In addition to *Flatpack2* rectifiers, the systems use the *Smartpack2 Master* and *Smartpack2 Basic* controllers or the *Smartpack* controller as their

building blocks. The range covers integrated, cabinetized and outdoor system solutions.

Float charge

Similar to trickle charge. Compensates for the self-discharge on a lead acid battery.

Float Mode

Float Mode is one of the PowerSuite's operation modes, where the rectifiers charge the batteries enough to compensate for self-discharging.

FTP Server

Trivial File Transfer Protocol Server (TFTP). A host to provide services according to TFTP; a TCP/IP standard protocol for file transfer with minimal capability and overhead depending on UDP for its datagram delivery service.

Generator

An *engine-generator* is the combination of an *electrical generator* and an *engine* (prime mover) mounted together to form a single piece of equipment. This combination is also called an *engine-generator* set or a **gen-set**. In many contexts, the engine is taken for granted and the combined unit is simply called a **generator**.

Gen-Set

See generator

GUI

GUI is pronounced GOO-ee, and is an acronym for **Graphical User Interface**. Usually it is a program interface that takes advantage of the computer's graphics capabilities to make the program easier to use, such as the **WebPower browser-based** interface or the **PowerSuite** Windows application or the **graphical menus in the Smartpack2 Master** controller.

Well-designed graphical user interfaces can free the user from learning complex command languages. On the other hand, many users find that they work more effectively with a command-driven interface, especially if they already know the command language.

HTTP

Hypertext Transfer Protocol (HTTP) is a communications protocol for the transfer of information on intranets and the World Wide Web. Its original purpose was to provide a way to publish and retrieve hypertext pages over the Internet.

HUB

A common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN. A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets.

I/O

Short for Input /Output. The term I/O is used to describe any program, operation or device that transfers data to or from a computer and to or from a peripheral device. Every transfer is an output from one device and an input into another.

IEC

The International Electrotechnical Commission (IEC) is a leading organization that prepares and publishes International Standards for all electrical, electronic and related technologies. The most familiar guiding organization in Europe; based in Switzerland.

InstallShield Wizard

A graphical screen interface that guides you through the steps required to install a Windows based software application, such as PowerSuite.

InstallShield for Windows Installer by InstallShield Software Corporation.

The InstallShield Software Corporation creates products that distribute and manage digital content by using packaged applications.

IP Address

The Internet Protocol Address

IP version 4 addresses (IPv4) uses 32-bit (4-byte) addresses, which limits the address space to 4,294,967,296 possible unique addresses. However, IPv4 reserves some addresses for special purposes such as private networks (~18 million addresses) or multicast addresses (~270 million addresses).

IPv4 addresses are usually represented in dot-decimal notation (four numbers, each ranging from 0 to 255, separated by dots, e.g. 208.77.188.166). Each part represents 8 bits of the address, and is therefore called an octet.

IT

I= isolation; T= earth

See also IEC Earthing System

LAN

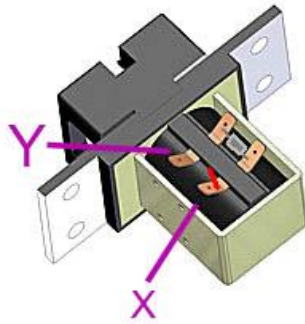
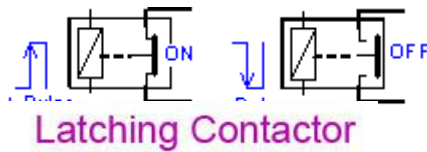
Local Area Network

A local area network is a computer network covering a small physical area, like a home, office, or small group of buildings, such as a school, or an airport. Current LANs are most likely to be based on Ethernet technology.

Latching Contactor

Magnetically latching contactor

The coil of latching contactors is not energized in any state. They change state from open to close, or vice versa, when a reversed pulse voltage is applied to its coil.



Latching Contactors

See Latching Contactor

Local Area Network

A local area network is a computer network covering a small geographic area, like a home, office, or group of buildings.

Current LANs are most likely to be based on switched IEEE 802.3 Ethernet technology, running at 10, 100 or 1,000 Mbit/s, or on IEEE 802.11 Wi-Fi technology.

Each node or computer in the LAN has its own computing power but it can also access other devices on the LAN subject to the permissions it has been allowed. These could include data, processing power, and the ability to communicate or chat with other users in the network.

LVBD

Low Voltage Battery Disconnect contactor

System internal latching contactor that disconnects the battery bank from the load, when a certain voltage limit is reached or other battery critical events occur.

LVD

Low Voltage Disconnect contactor

System internal latching contactor that disconnects the batteries from the load or the output power from non-priority load, when a certain voltage limit is reached or a certain event occurs.

LVLD

Low Voltage Load Disconnect contactor

System internal latching contactor that disconnects the output power from non-priority load, when a certain voltage limit is reached or the mains input fails or other events occur.

MAC Address

Media Access Control Address

Every Ethernet network card has a unique 48-bit serial number called a MAC address, which is stored in ROM carried on the card. Every computer on an Ethernet network must have a card with a unique MAC address. Normally it is safe to assume that no two network cards will share the same address, because card vendors purchase blocks of addresses from the Institute of Electrical and Electronics Engineers (IEEE) and assign a unique address to each card at the time of manufacture.

MCB

Miniature Circuit Breaker (MCB)

Originally this term was for a product that met the requirements of IEC 60 898 or IEC 60 947-2, was DIN rail mounted and generally no wider than 25 mm per pole.

Today MCBs may also refer to devices that also meet North American standards such as UL 489, UL 1077, CSA 22.2 No. 5 and No. 235.

MIB

Management Information Base, a database of objects that can be monitored by a network management system. SNMP uses standardized MIB formats that allows any SNMP tools to monitor any device defined by a MIB

Micropack

Eltek's modern range *Micropack* rectifiers used in *Micropack* DC power supply systems. The systems use the *Compack* controller, *Micropack* rectifiers, Battery Distribution Base and Load Distribution Bases as their building blocks. All units are designed for DIN rail mounting.

The range covers low power solutions in telecom and industrial applications.

Mini Hub

A common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN. A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets

Minipack

Eltek's range of *Minipack* rectifiers used in *Minipack* DC power supply systems. The systems use either the *Smartpack* or the *Compack* controllers and *Minipack* rectifiers as their building blocks.

Minipack systems implement a unique system design with extractable system shelf for easy access and fast installation. Complete 1U high systems offer up to 1.6kW DC output power, while 2U high systems deliver up to 4.8kW.

Modem

A modem (from **mod**ulate and **demod**ulate) is a device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information.

NC-C-NO

Acronym for Normally Closed, Common and Normally Open. The expression refers to the position of 3 relay contacts, when the relay coil is de-energized. When the relay coil is energized, the NC-C contacts open, and the C-NO contacts close.

NEC

National Electric Code (NEC), in the USA, guide electricians in the proper installation of electrical equipment, and defines among other things the specific requirements for circuit protection.

Circuit protection is required to prevent fires from occurring, due to overcurrent faults or short-circuits.

Negative DC Distribution

It is usually implemented in 48V and 60V DC power supply systems, which have the **DC distribution on the negative output** (-48VDC or -60VDC), and the positive on a Common Positive DC Output Rail (0V).

NFPA

National Fire Protection Association (NFPA) in the USA

NIC

Network Interface Controller.

A network card, network adapter, network interface controller, network interface card, or LAN adapter is a computer hardware component designed to allow computers to communicate over a computer network. It is both an OSI layer 1 (physical layer) and layer 2 (data link layer) device, as it provides physical access to a networking medium and provides a low-level addressing system through the use of MAC addresses. It allows users to connect to each other either by using cables or wirelessly.

NMS

Network Management Station -An SNMP Manager application which interfaces with the SNMP Agent and provides communication capabilities through standard SNMP messaging commands (SET, GET). The NMS also serves to collect SNMP TRAP events.

A Network Management System (NMS) is a combination of hardware and software used to monitor and administer a network.

NO-C-NC

Acronym for Normally Open, Common and Normally Closed. The expression refers to the position of 3 relay contacts, when the relay coil is de-energized. When the relay coil is energized, the NO-C contacts close, and the C-NC contacts open.

Nominal voltage

The cell voltage that is accepted as an industrial standard.

Non-Priority Load

Telecom equipment or similar supplied from the DC power system's load output circuits. The equipment's continuous operation is NOT essential, and has low backup priority during Mains outages.

Generally, the DC power system temporally stops supplying this equipment during a system critical condition, or when the equipment's backup leasing time has expired.

Normal Condition

A DC power system's state when no serious circumstances occur. Usually, the DC power supply system is in *normal condition* when no critical condition occurs.

Normal State

The state of a voltage output or the position of alarm relay contacts when the output is in normal condition (not activated).

Overcharge

Charging a battery after it reaches full charge. On overcharge, the battery can no longer absorb charge and the battery heats up.

Overcurrent

The National Electrical Code (NEC) defines overcurrent as any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short-circuit, or ground fault.

OVP

Over Voltage Protection

OVS

Over Voltage Shutdown

When the output voltage of a malfunctioning rectifier reaches a certain limit, the system automatically shuts down to prevent damages.

pComm

RS232 serial protocol used by *Eltek*'s controllers for communication with computers, modems, WebPower adapters and other equipment.

Pop-up

A window that suddenly appears (pops up) when you select an option with a mouse or press a special function key. Usually, the pop-up window contains a menu of commands and stays on the screen only until you select one of the commands. It then disappears. A special kind of pop-up window is a pull-down menu, which appears just below the item you selected, as if you had pulled it down.

Positive DC Distribution

It is usually implemented in 24V DC power supply systems, which have the **DC distribution on the positive output** (24VDC), and the negative on a Common Negative DC Output Rail (0V).

Powerpack

Eltek's modern range of *Powerpack* three-phase rectifiers used in *Powerpack* DC power supply systems. The systems use the *Smartpack* controller and large *Powerpack* three-phase rectifier modules as their building blocks.

PowerSuite

Advanced PC application used to configure and operate *Micropack*, *Minipack*, *Flatpack2* and *Powerpack* DC power supply systems. The program is to be run on computers using the MS Windows operating systems.

Priority Load

Very important telecom equipment or similar supplied from the DC power system's load output circuits. The equipment's continuous operation is essential and has high backup priority during Mains outages.

PSS

Power Supply System

RCD

Residual Current Device

They are simple fittings designed to help prevent electric shock and other accidents due to faulty electrical appliances or wiring.

An RCD can detect changes in the proper flow of electric current (when a flex or cable is cut, for instance, or an electrical tool malfunctions). Within milliseconds of this happening, the RCD automatically disconnects the power supply to the equipment before further damage can be done.

REVP

Recommended End-Voltage Point. Read also “ [d2h bmk Ref228001673_615](#)” on page **Error! Bookmark not defined.**

RJ-45

Short for Registered Jack-45, an eight-wire connector used commonly to connect computers onto local area networks (LAN), especially Ethernets. RJ-45 connectors look similar to the ubiquitous RJ-11 connectors used for connecting telephone equipment, but they are somewhat wider.

RS232

Serial communication bus or communication port

Serial data port that allows for connection of data devices in accordance with EIA standards

RS485

Serial communication bus or communication port

Shunt

A current shunt is usually a resistor of accurately-known very small resistance that allows the measurement of current values too large to be directly measured by a particular ammeter.

The current shunt is placed in series with the load, so that nearly all of the current to be measured will flow through it. The voltage drop across the shunt is proportional to the current flowing through it, and since its resistance is known, a millivolt meter connected across the shunt can be scaled to directly read the current value.

Shunts are rated by maximum current and voltage drop at that current, for example, a 500A/75mV shunt would have a resistance of 0.15 milliohms, a maximum allowable current of 500 amps and at that current the voltage drop would be 75 millivolts.

By convention, most shunts are designed to drop 75mV when operating at their full rated current and most "ammeters" are actually designed as voltmeters that reach full-scale deflection at 75mV.

Smartpack

A versatile microprocessor-based controller used for monitoring *Minipack*, *Flatpack2* and *Powerpack* DC power supply systems in a network.

Smartpack2

A modular, microprocessor-based control system used in modern *Flatpack2* DC power supply systems in a network.

The control system is distributed between the *Smartpack2 Master* controller, the *Smartpack2 Basic* controller and the *I/O Monitor2* control unit.

SNMP

Simple Network Management Protocol, a set of protocols for managing complex networks. The first versions of SNMP were developed in the early 80s. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.

SNMP Agent

An SNMP-compliant device that stores data about itself in Management Information Bases (MIBs) and return this data to the SNMP requesters.

SOC

State of Charge; See Cycle life

Software

Software are programs for directing the operation of computers, microprocessors, controllers, etc. or for processing electronic data.

SOH

State of Health; See Cycle life

SPD

Surge Protection Device

A surge protector (or surge suppressor) is an appliance designed to protect electrical devices from voltage spikes. A surge protector attempts to regulate the voltage supplied to an electric device by either blocking or by shorting to ground voltages above a safe threshold.

Strapping

Storage tank calibration is also known as **Tank Strapping**. Consists of measurement of the tank geometry and calculation of capacity tables or **strapping tables**, which provide conversion from depth of product, in linear units of measurement, to volume of contents.

TCP/IP

Transmission Control Protocol/Internet Protocol

A protocol suite used by more than 15 million users with a UNIX association and widely used to link computers of different kinds.

The Internet Protocol Suite (commonly known as TCP/IP) is the set of communications protocols used for the Internet and other similar networks. It is named from two of the most important protocols in it: the Transmission Control Protocol (TCP) and the Internet Protocol (IP), which were the first two networking protocols defined in this standard.

Test Mode

Test Mode is one of the PowerSuite's operation modes, where the system controller is performing a specific preprogrammed test of the battery bank.

The Cycle

A process consisting of a single charge and discharge of a rechargeable battery.

TN

T= earth (Latin: terra); N= neutral

See also IEC Earthing System

Trickle charge

Maintenance charge to compensate for the battery's self-discharge.

TT

T= earth (Latin: terra); T= earth

See also IEC Earthing System

Tunnelling Protocol

The term tunnelling protocol is used to describe when one network protocol called the payload protocol is encapsulated within a different delivery protocol.

UDP

The User Datagram Protocol (UDP) is one of the core members of the Internet Protocol Suite, the set of network protocols used for the Internet. With UDP, computer applications can send messages, sometimes known as datagrams, to other hosts on an Internet Protocol (IP) network without requiring prior communications to set up special transmission channels or data paths. UDP is sometimes called the Universal Datagram Protocol.

UL

Underwriters Laboratories Inc. (UL) is an independent product safety certification organization. Established in 1894, the company has its headquarters in Northbrook, Illinois, USA. UL develops standards and test procedures for products, materials, components, assemblies, tools and equipment, chiefly dealing with product safety.

URL

URL is an abbreviation of Uniform Resource Locator, the global address of documents and other resources on the World Wide Web.

The first part of the address is called a protocol identifier (ftp, http, etc.) and it indicates what protocol to use. The second part is called a resource name and it specifies the IP address or the domain name where the resource is located. The protocol identifier and the resource name are separated by a colon and two forward slashes. For example: <ftp://sw.eltek.com/powersuite.exe> and <http://www.eltek.com/index.html>

USB

Universal Serial Bus is a serial bus standard to interface devices to a host computer. USB was designed to allow many peripherals to be connected using a single standardized interface socket and to improve plug and play capabilities by allowing hot swapping, that is, by allowing devices to be connected and disconnected without rebooting the computer or turning off the device. Other convenient features include providing power to low-consumption devices without the need for an external power supply and allowing many devices to be used without requiring manufacturer specific, individual device drivers to be installed.

VPN

A virtual private network (VPN) is a computer network in which some of the links between nodes are carried by open connections or virtual circuits in some larger network (e.g., the Internet) as opposed to running across a single private network. The link-layer protocols of the virtual network are said to be tunnelled through the larger network. One common application is secure communications through the public Internet, but a VPN need not have explicit security features, such as authentication or content encryption. VPNs, for example, can be used to separate the traffic of different user communities over an underlying network with strong security features.

WAN

Wide Area Network is a computer network that covers a broad area (i.e., any network whose communications links cross metropolitan, regional, or national boundaries [1]). Less formally, a WAN is a network that uses routers and public communications links [1]. Contrast with personal area networks (PANs), local area networks (LANs), campus area networks (CANs), or metropolitan area networks (MANs) are usually limited to a room, building, campus or specific metropolitan area (e.g., a city) respectively. The largest and most well-known example of a WAN is the Internet.

WebPower

A common name for the firmware installed in *Eltek's* controllers – *Smartpack2 Master*, *Compack* and *Smartpack*, web option – and in the external *WebPower* adapter module. The firmware provides a communication protocol translator, a physical layer conversion and Web server software.

WebPower translates the controller's internal protocol into the HTTP protocol over TCP/IP, used to communicate in an Ethernet network, LAN, WAN, VPN or even across the Internet.

The *WebPower* firmware provides a platform-independent graphical user interface (GUI), employed to configure and operate *Micropack*, *Minipack*, *Flatpack2* and *Powerpack* DC power supply systems using a standard Web browser.

In addition, *WebPower* provides an SNMP Agent, allowing *Eltek* DC power systems to be interoperable with SNMP enterprise management solutions, which are commonly in use within the Telecommunications industry.

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