Power Supply System ~ Telecom

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ELTEK VALERE
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User's Guide

Smartpack Controllers

Monitoring and Control Units

Powerpack, Flatpack2 & Minipack
DC Power Supply Systems

350003.013

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Safety Precautions

- ☑ The equipment described in this manual must only be operated by Eltek Valere personnel or by persons who have attended a suitable Eltek Valere training course
- ☑ The equipment represents an energy hazard and failure to observe this could cause terminal injury and invalidate our warranty
- ☑ There are hazardous voltages inside the power system. As the modules incorporate large charged capacitors, it is dangerous to work inside the system even if the mains supply is disconnected
- ☑ Products into which our components are incorporated have to comply with a number of requirements. Installation is to be in accordance with the recommendations herein
- ☑ Please read the manual carefully before using the equipment

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1. Introduction

Smartpack controllers are powerful and cost-effective modules, developed for monitoring and controlling a wide range of *Eltek Valere's* DC power supply systems, such as *Powerpack, Flatpack2* and *Minipack* DC power systems.

About this Guide

This booklet provides users of *Smartpack*-based DC power systems with the required information for operating the system using the *Smartpack*'s front panel. The booklet also describes the *Smartpack* controller's building blocks, external connections and technical specifications, as well as available controller options and other CAN bus nodes.

Read also the generic and site specific documentation for your *Smartpack*-based DC power system.

For detailed functionality description, browse and search through *PowerSuite Online Help*.

System Diagram — Flatpack2 Power System

In the *Flatpack2 PS* system shown in Figure 1, the *Smartpack* controller monitors and controls the whole system, and serves as the local user interface between you and the system. The *Po*werSuite application is used for remote operation and system configuration.

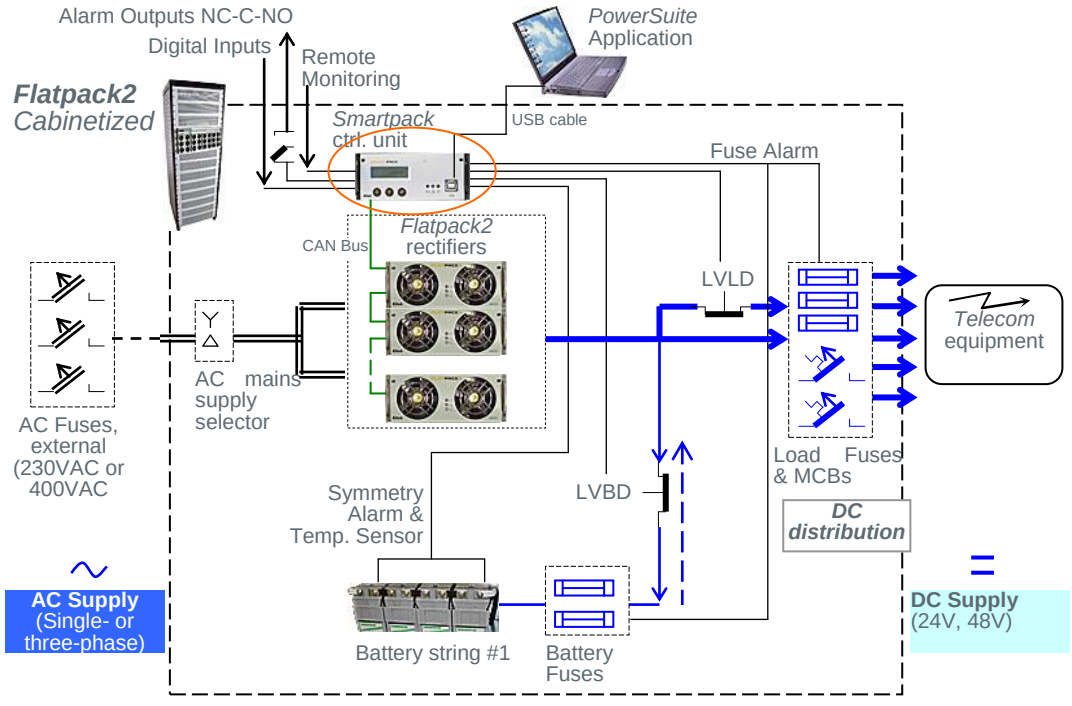


Figure 1 Example of a typical Flatpack2 PS *system for DC power supply of telecom equipment. The system is fed from an external AC mains supply, and consists of rectifiers in power shelves, a control unit and DC distribution unit. Battery banks, LVD contactors, etc. are typically also a part of the system.*

2. Control Units

The control system — in Eltek Valere 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:

- *Smartpack* controllers, see page 9
- *Smartnode* control units, see page 51
- Battery Monitors, see page 52
- Load Monitors, see page 53
- I/O Monitors, see page 54
- Mains Monitors
- CAN Power Unit, see page 55
- Other CAN nodes

CAN bus

The *Smartpack*-based DC power systems utilize the CAN[1] bus — a digital interface architecture that supports a dedicated communication channel between the control units and each of the rectifiers.

CAN bus Addressing

All rectifiers, *Smartpack* controllers and other control units connected to the *Eltek Valere*'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 controllers and control units use DIP switches for configuring their unique CAN bus ID number (**hardware assignment**)

Software Assignment — Rectifiers

Each rectifier in the *Smartpack*-based DC power system is automatically configured by the *Smartpack* controller with a unique CAN bus ID number (software-assignment).

When the rectifiers are hot-plugged in the power shelves the first time, the *Smartpack* 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 hot-plugged in the power shelf again, 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 *Smartpack* controller is inserted in 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.

[1] Control Area Network. Serial protocol utilised for communication between *Eltek Valere*'s rectifiers and controllers

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).

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 the table in this chapter and Figure 3, page 8.

CAN Bus Address Range — Control Units

You can address a maximum of 14 control units of each type — Smartpack controllers, Smartnode units, Battery Monitors, Load Monitors, etc. — to the control system's CAN bus. See table below:

Number of nodes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Smartpack 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 CAN nodes	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	<-- ID #
Mains Monitor nodes	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	<-- ID #

ID numbers in red 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).

The table below shows examples of the DIP switch position on Smartpack controllers, Smartnode control units and other CAN bus nodes:

Smartpack Controller	ID #	DIP Switch Position 1 -- 2 -- 3 -- 4
(Master) Controller 1	1	OFF--OFF--OFF--OFF
(Slave) Controller 2	2	**ON**--OFF--OFF--OFF
(Slave) Controller 3	3	OFF-- **ON**--OFF--OFF
(Slave) Controller 4	4	**ON**-- **ON**--OFF--OFF
(Slave) Controller 5	5	OFF--OFF-- **ON**--OFF
(Slave) Controller 6	6	**ON**--OFF-- **ON**--OFF
(Slave) Controller 7	7	OFF-- **ON**-- **ON**--OFF
(Slave) Controller 8	8	**ON**-- **ON**-- **ON**--OFF
(Slave) Controller 9	9	OFF--OFF--OFF-- **ON**
(Slave) Controller 10	10	**ON** --OFF--OFF-- **ON**
(Slave) Controller 11	11	OFF-- **ON** --OFF-- **ON**
(Slave) Controller 12	12	**ON** -- **ON** --OFF-- **ON**
(Slave) Controller 13	13	OFF--OFF-- **ON** -- **ON**
(Slave) Controller 14	14	**ON** --OFF-- **ON** -- **ON**

Note that the controller's ID # corresponds to the DIP switch's binary value plus 1.

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
Smartnode 9	25	OFF--OFF--OFF-- **ON**
Smartnode 10	26	**ON** --OFF--OFF-- **ON**
Smartnode 11	27	OFF-- **ON** --OFF-- **ON**
Smartnode 12	28	**ON** -- **ON** --OFF-- **ON**
Smartnode 13	29	OFF--OFF-- **ON** -- **ON**
Smartnode 14	30	**ON** --OFF-- **ON** -- **ON**

Note that the unit's ID # corresponds to the DIP switch's binary value plus 17.

Battery Monitor	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 # corresponds to the DIP switch's binary value plus 33.

Load Monitor	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 # corresponds to the DIP switch's binary value plus 49.

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)*, see Figure 2. The CAN bus is connected using CAT5 twisted-pair cables.

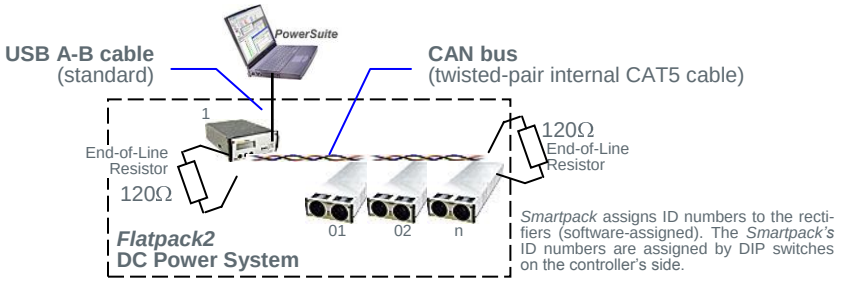


Figure 2 CAN bus terminated with a 120Ω resistor on both line ends (60Ω bus impedance)

The example in Figure 3 shows a *Flatpack2* DC power system expanded with a slave controller to implement additional digital inputs, relay outputs or similar functionality.

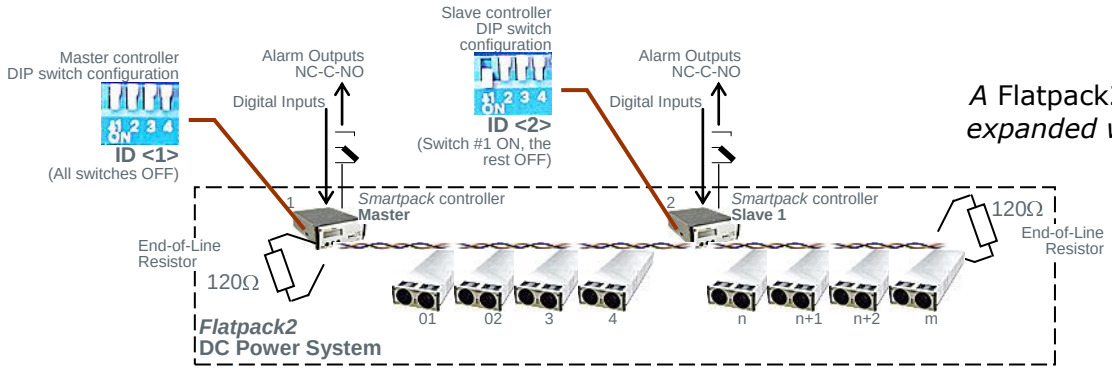


Figure 3
A Flatpack2 *DC power system expanded with two controllers*

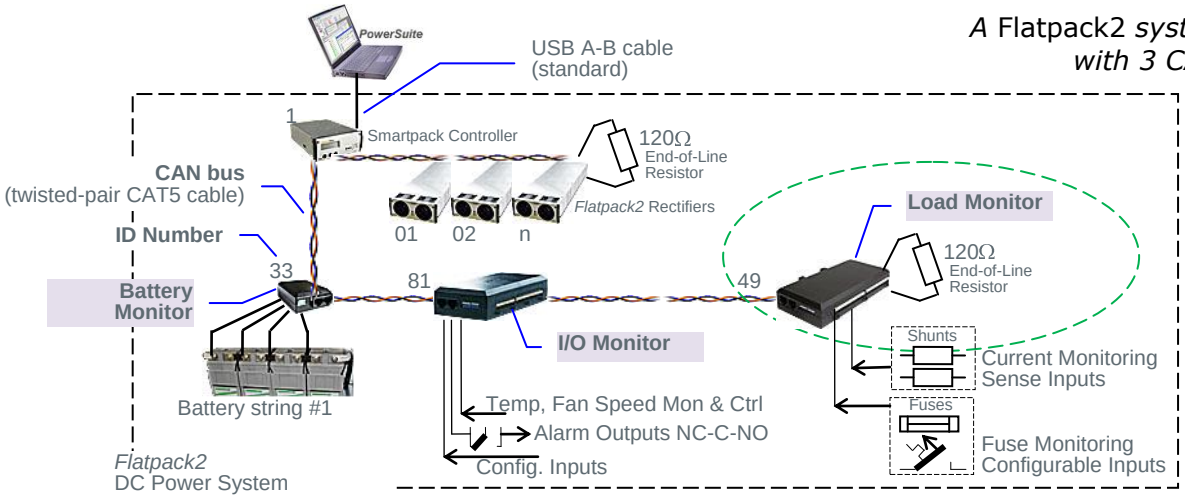


Figure 4
A Flatpack2 *system expanded with 3 CAN bus Nodes*

Configuration — Control Units

Each control unit must be configured with a CAN bus address (or ID number), to enable multiple units to communicate reliably on the CAN bus (hardware-assignment). The addresses are configured via DIP-switches. Read chapter "CAN Bus Address Range — Control Units" on page 7.

You must then configure and calibrate the unit using the *PowerSuite* software application. Read the *PowerSuite Online Help System* for a description of how to configure and calibrate the CAN Bus Nodes.

3. The *Smartpack Controller*

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 Valere'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. See also chapter "Technical Specifications", on page 21.

Key Features

- ✧ Front panel LCD and buttons for on-site service without PC.
- ✧ USB- or RS-232 interface for PC connection locally or remote monitoring and control via modem, Ethernet, web or SNMP.
- ✧ Main program upgrade via USB port and the FWLoader application
- ✧ 6 user programmable relay outputs for traditional remote control
- ✧ 6 user programmable inputs for monitoring of other equipment on site
- ✧ Battery monitoring and testing without site attendance
- ✧ Temperature compensated charging for increased battery lifetime
- ✧ Battery lifetime indication
- ✧ Password protected operator access levels
- ✧ Alarm/event log with time and date
- ✧ Windows-based PC communication software

Block Diagram

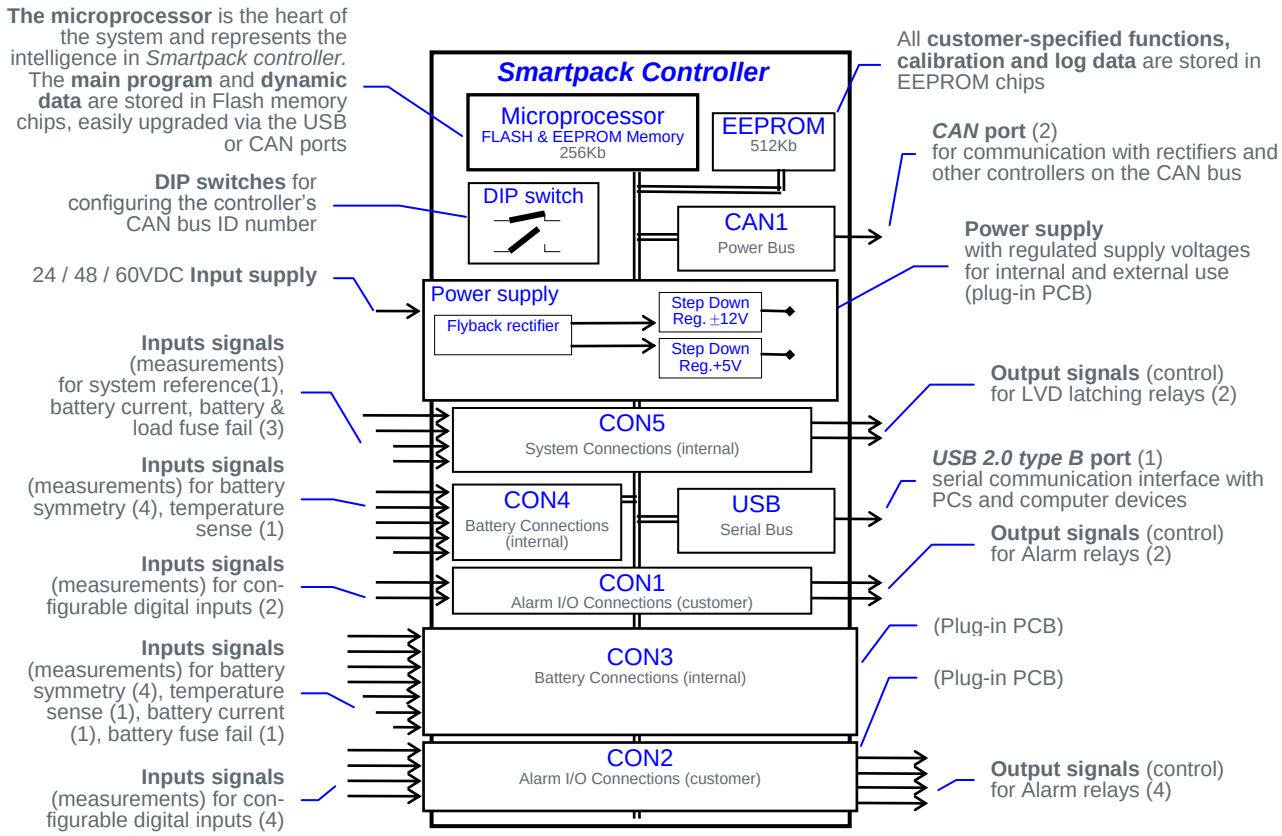
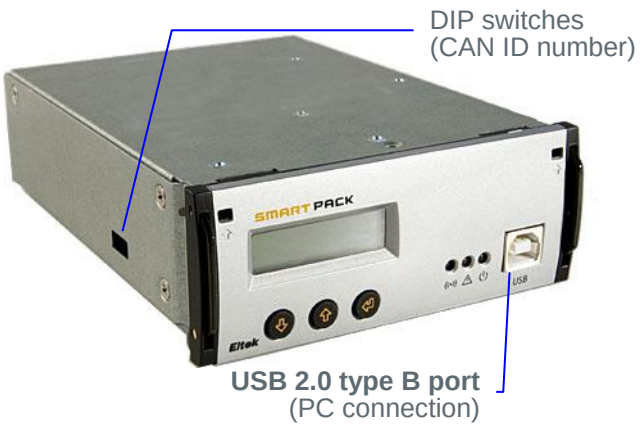


Figure 5 Block diagram of the Smartpack *Battery Extended controller showing the module's main functions*

Typical Applications

The *Smartpack* controller employs CAN bus communication with the rectifiers in the *Smartpack*-based DC power system — and other bus-connected *Smartpack* control units in the system — thus enabling flexible expansion of system functionality and number of measuring points. System components can be set up and upgraded to meet the demand of any tailor-made power solution.

Location of Connectors & Communication Ports



You can easily connect the *Smartpack* controller to a PC, plugging a standard USB A-B cable to the USB port on the front of the controller and to any available USB port on the computer.

The *Smartpack* controller is configured from factory — via DIP switches on the side — with an ID number for CAN bus communication. Read chapter "CAN Bus Address Range — Control Units" on page 7.

On the controller's rear panel —see Figure 7 — you find two identical RJ45 CAN ports (for incoming and outgoing CAT5 twisted-pair cables) to connect the controller to the CAN bus. See also chapter "CAN bus", on page 6.

Figure 6 Front access USB port, and DIP switches for ID configuration on the side.

The *Smartpack* controller's system cable connections are located on the controller's rear panel. These connections are used for monitoring and controlling the system, the batteries, alarm relays and status of external equipment.

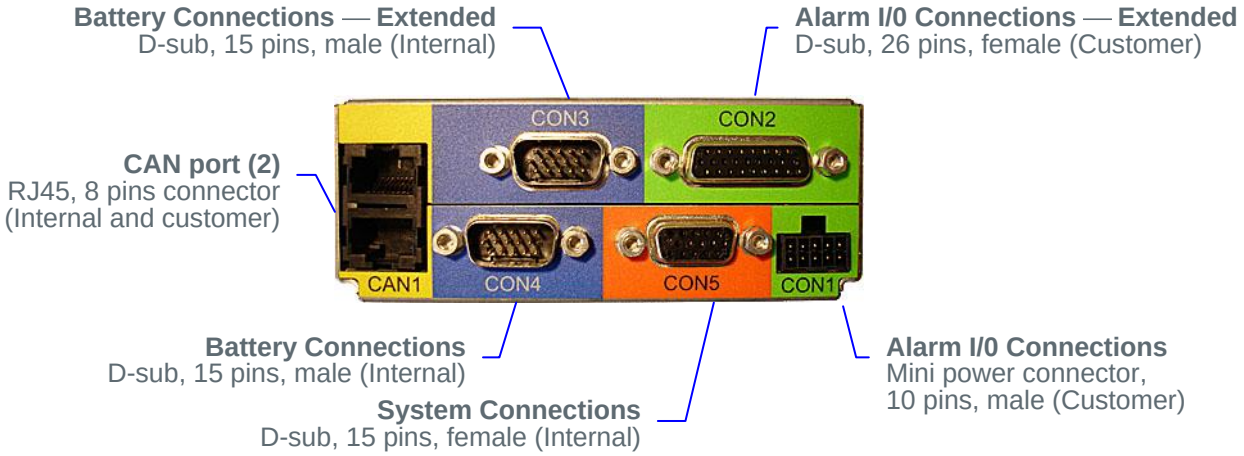
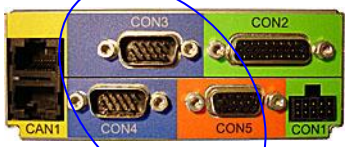


Figure 7 Rear plug connections on a Smartpack *Battery Extended controller*

System & Battery Signals — Internal Connections



In standard *Smartpack*-based DC power systems, the controller's internal signals are cabled either directly to the corresponding monitoring or measuring points, or to internal terminals, as shown in Figure 8. See your system's specific arrangement drawings.

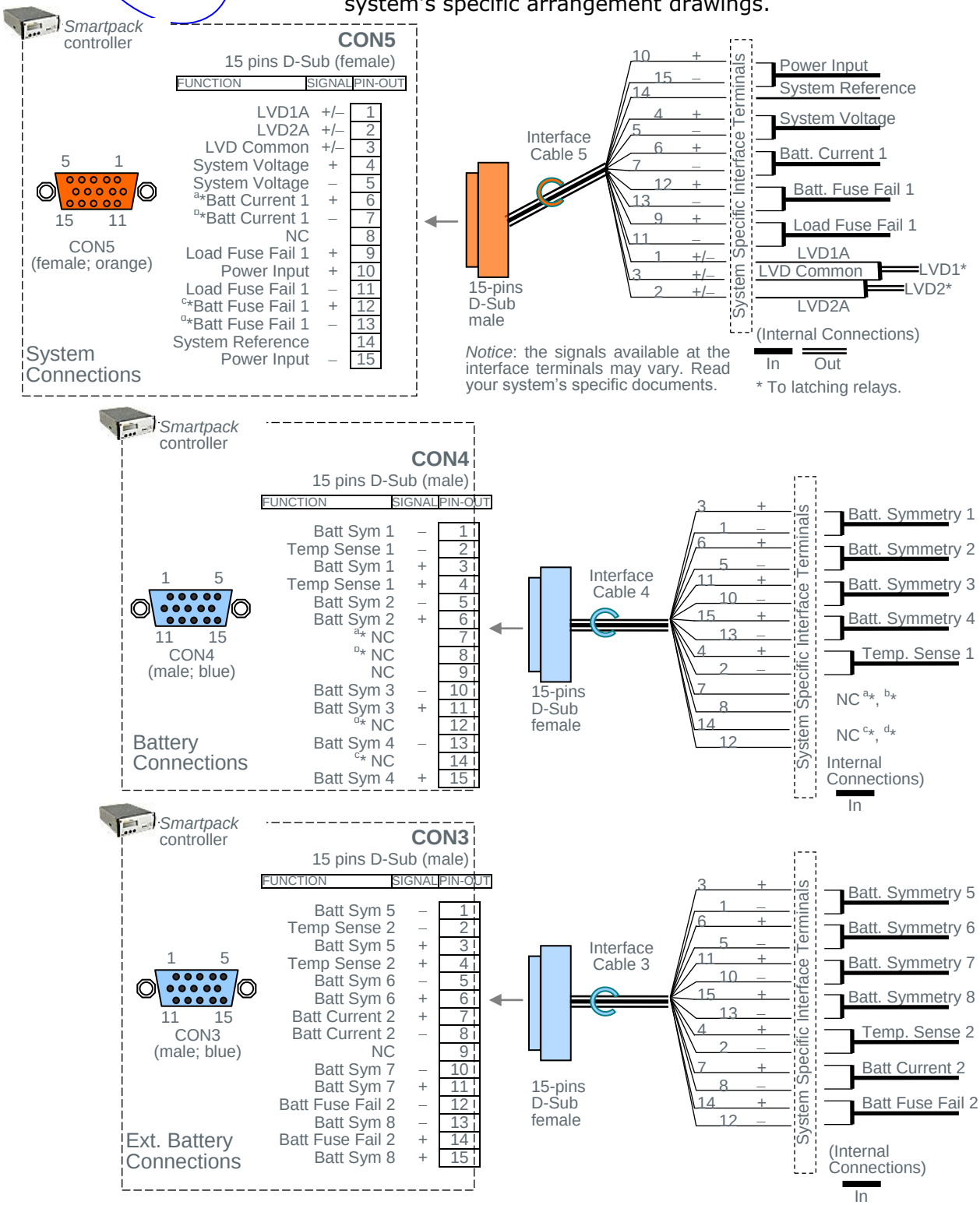


Figure 8 Overview of internal system and battery connections

Alarm Relay & Digital Input Signals — Customer Connections

In standard *Smartpack*-based DC power systems, the controller's customer alarm relay and digital input signals are cabled to dedicated easy accessible terminals, as shown in Figure 9. See also your system's specific arrangement drawings.

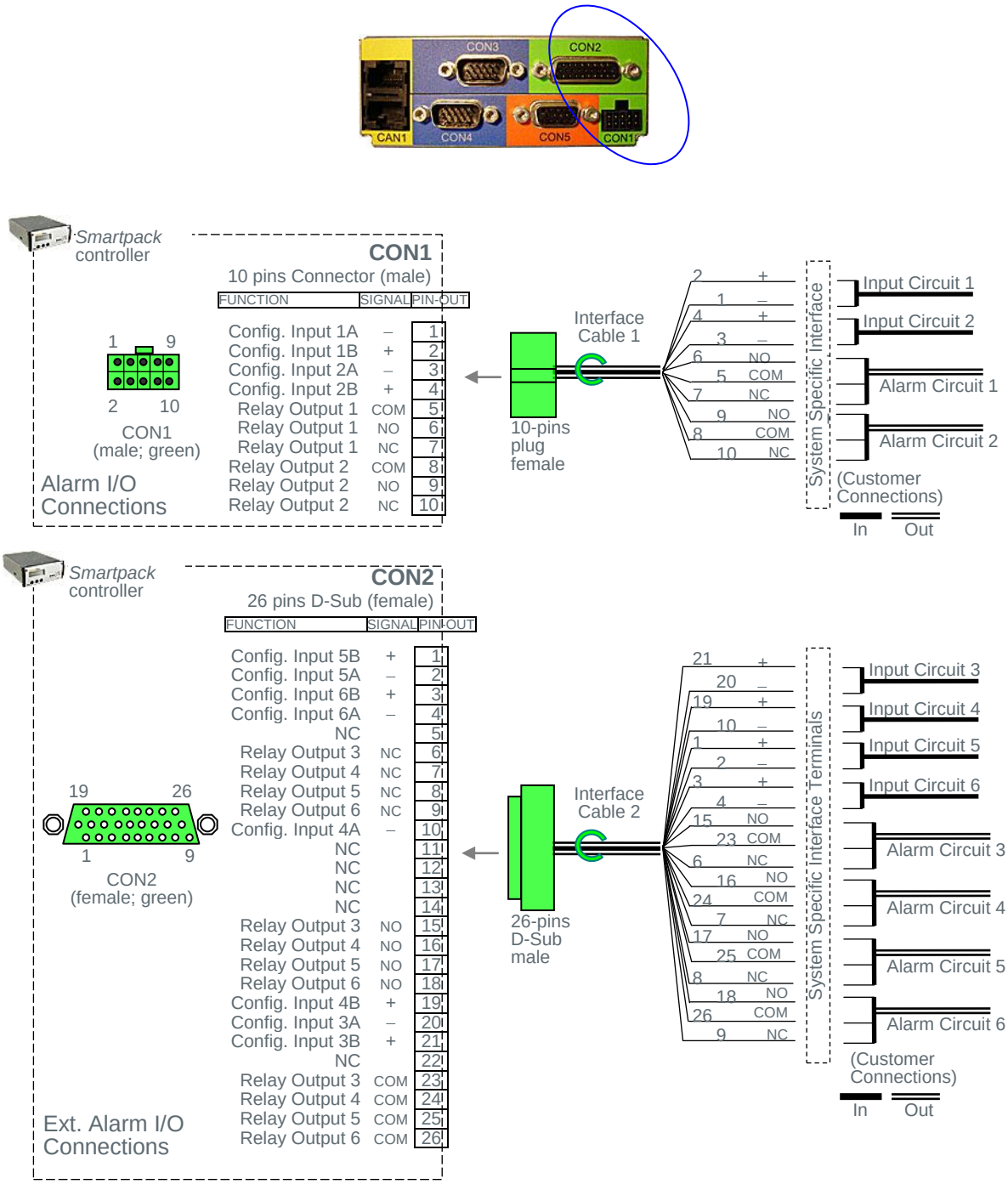
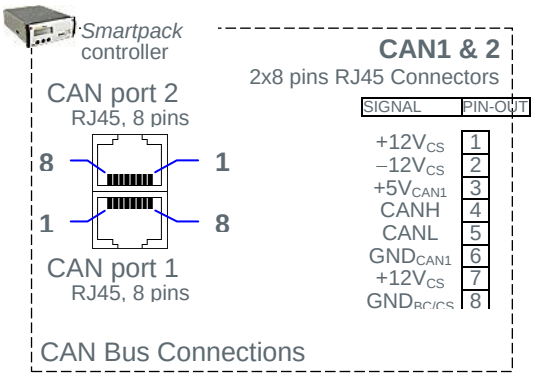


Figure 9 Overview of customer connections — alarm relay & digital input signals

CAN Port Signals — Internal Connections



Figur 10 CAN port signals

CAN port 1 and 2 are electrically identical, and are used to enable connection of the CAN bus incoming and outgoing CAT5 cables.

A special RJ45 plug with built-in 120Ω end-of-line resistor can be connected to one of the CAN ports; refer to Figure 2, page 8.

CAN ports' pin 1&2 may supply the slave controller with 12VDC, 16W via the CAN bus.

Installation of Smartpack Controller

Safety precautions

Get acquantied with the satety precautions on page 2, before installing or handling the equipment.

Mounting and Removing the Controller

The *Smartpack* controller incorporates handles that serve both to lock the module into position and to pull it out of its housing.

Device hazard

CAUTION: **Do not hand-carry** the controller by its handles. **Cables are plugged** to the controller's rear panel. **Open the handles before inserting** the controller into the power shelf.

Mount **blind panels** in unused module locations.

Electric shock

Mounting the *Smartpack* controller

1. **Open the handles** by inserting a screwdriver into the holes to release the spring mechanism
2. **Insert the module** fully into the power shelf, after plugging the cables to the rear panel
3. **Lock the handles** by pushing the handles up into their housings (locked position), so that the module is securely locked

Removing the Smartpack controller

1. **Open the handles** by inserting a screwdriver into the holes to release the spring mechanism
2. **Remove the module** by using both handles to pull the module loose gently; support from underneath; unplug the cables connected to the rear panel

Figure 11 Smartpack controller's locking mechanism

Removing Blind Panels

Release the panel's upper left and right corners by inserting a small screwdriver into the panel's upper left gap, and carefully press down and out to release the locking tabs. Repeat on the upper right gap. Refer to the *Flatpack2* system's quick start guide for more information.

Front Panel Operation

This chapter describes the *Smartpack* controller's keys and indicators, and how to operate the *Smartpack*-based DC power system from the controller's front panel.

Description of Keys, Display and Indicators

The *Smartpack* controller's front panel consists of two functional areas: the *presentation area* (LCD display and LED lamps) and the *control area* (keys). For information about the handles and the USB port, read pages 10 and 14.

Figure 12 Smartpack controller's front keys and indicators

LED indicators

The *Smartpack* controller has the following LED indications:

- "Power" (green) indicates that the power supply is ON or OFF
- Alarm (red) indicates an alarm situation (major alarm)
- Warning (yellow) indicates an abnormal situation (minor alarm)

LCD Display

The graphic display is an important part of the power supply system's user interface. The display is in *Status Mode* (displays the system's status) or in *Menu Mode* (displays the menu structure).

Depending on the display's mode, the upper line shows the output voltage or menu options, while the lower line displays battery and load current, alarms, or information about which key to press. See also chapter "Modes of Operation", on page 16.

Front Keys

You can control the whole *Smartpack*-based DC power system via a network of software menus accessed with the controller's front keys.

- Press on the ↵ key to change from *Status Mode* to *Menu Mode*.
- Press the ↓ or ↑ keys to scroll up or down and navigate to find menu options (function or parameter).
- Press then the ↵ key to select the function.

Modes of Operation

The controller's display is either in *Status Mode* or in *Menu Mode*.

Status Mode

When the front keys are not in operation, the display is in *Status Mode.* The following information is then scrolled through the display:

- The upper line continuously displays the battery voltage.
- The lower line continuously scrolls the following information:
    - Battery Current
    - Load Current
    - Active alarms
    - Other messages

Menu Mode

When the front keys are in operation, the controller's display switches to *Menu Mode* and the following information is scrolled through the display:

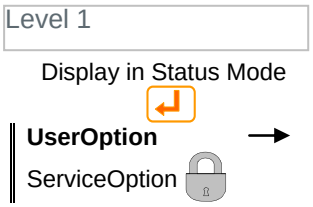
- The upper line shows the name of the active menu or sub-menu
- The lower line indicates which key to press

Notice that if no keys are pressed within 30 seconds, the display will automatically switch from *Menu Mode* and to back to *Status Mode*.

Operating Menus, Overview

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.

User Options

When you "enter" *Menu Mode,* you access the *User Options*.

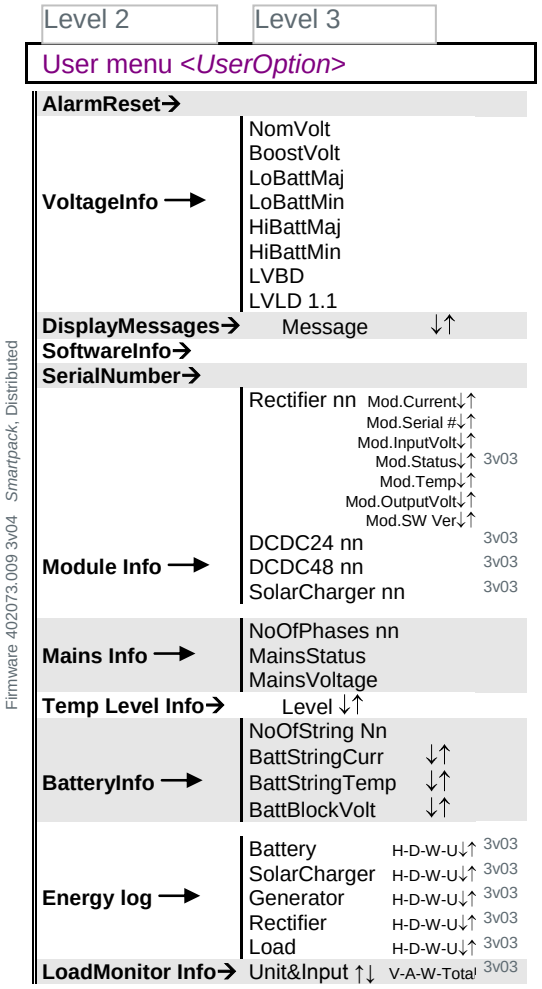
How to browse the display menus

- **Entering *Menu Mode***
  Press on the ↵ key to change from *Status Mode* to *Menu Mode*

- **Browsing "up" to a menu option or level**
  - Press the ↑ key to scroll up to the previous menu option
  - Often, when at the top option, also to scroll out to the previous menu level

- **Browsing "down" to a menu option**
  - Press the ↓ key, to scroll down within the same menu level, and find menu options (functions or parameters)
  - Often, when at the lowest option, also to scroll out to the previous menu level

- **Selecting a menu option**
  - Press on the ↵ key to select the displayed menu option or parameter
  - Often, especially in the User Menu, also to scroll out to the previous menu level



For description of the User menu options, read chapter "Functionality Description" page 57. Also, refer to the *PowerSuite or WebPower Online Help System*.

Service Options

When you enter Menu Mode, you access the User Options. You may then scroll down to the password protected Service Options.

The Service Option's password is factory-programmed to <0003>. We strongly recommend that this password is changed as soon as the system is installed

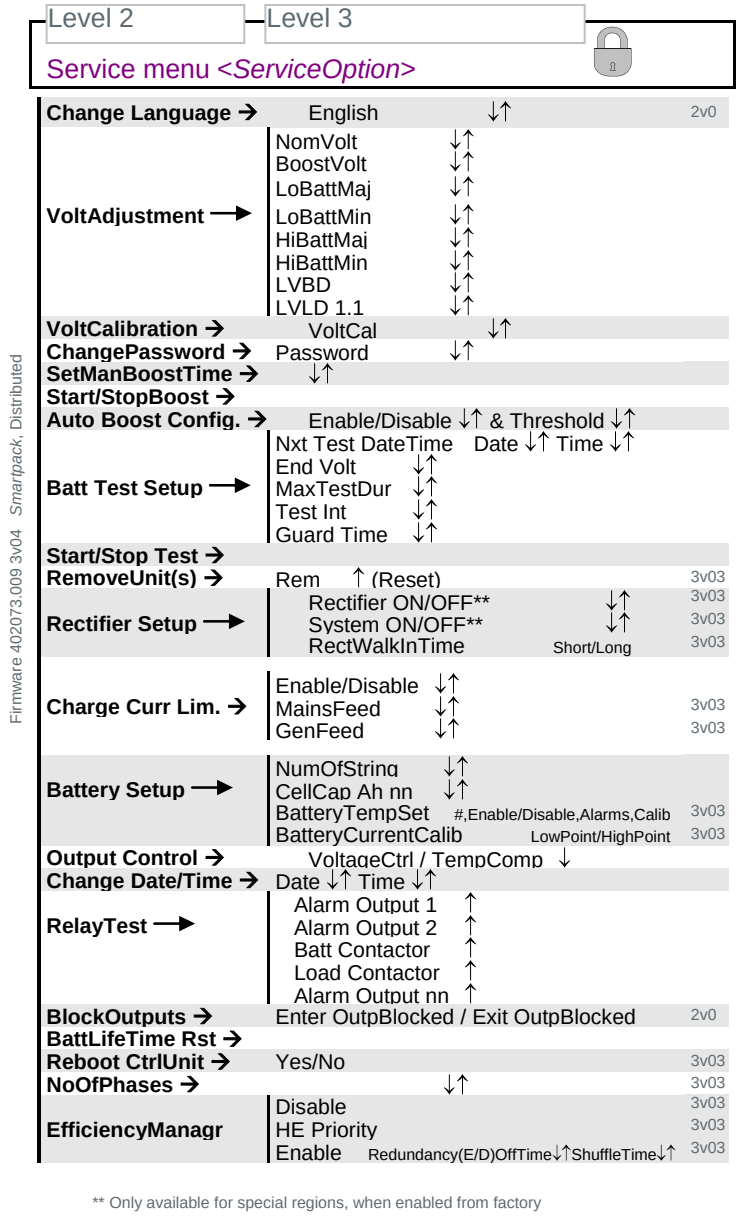
How to browse the display menus

- **Entering *Menu Mode***
  Press on the ↵ key to change from *Status Mode* to *Menu Mode*

- **Browsing "up" to a menu option or level**
  - Press the ↑ key to scroll up to the previous menu option
  - Often, when at the top option, also to scroll out to the previous menu level

- **Browsing "down" to a menu option**
  - Press the ↓ key, to scroll down within the same menu level, and find menu options (functions or parameters)
  - Often, when at the lowest option, also to scroll out to the previous menu level

- **Selecting a menu option**
  - Press on the ↵ key to select the displayed menu option or parameter
  - Often, especially in the User Menu, also to scroll out to the previous menu level



** Only available for special regions, when enabled from factory

For description of the Service menu options, refer to the *PowerSuite or WebPower Online Help System*.

Firmware Upgrade of the *Smartpack* controller

You can use the *FWLoader* program[2] running on a PC to upgrade the *Smartpack* controller's firmware. To find your controller's firmware version, refer to page 58. The PowerSuite program has to be installed previously on the PC. Do following:

1. **Connect a PC to the *Smartpack***
   using a standard USB cable
2. **Start the *FWLoader* program** on the PC;

   On the *FWLoader* dialog box:
3. **Select "Smartpack"**, in Target Selection
4. **Select "1"**, in Target Address
5. **Select "COMx"**
   in Communication Type. Refer to the *PowerSuite* program to find the communication port the PC uses to communicate with the controller.
6. Click on the "Open Source File" button and, **Select the file "*.mhx"**
   that contains the firmware to upgrade the controller with
7. **Click on the "Write to Target" button**, to load the firmware to the *Smartpack* controller

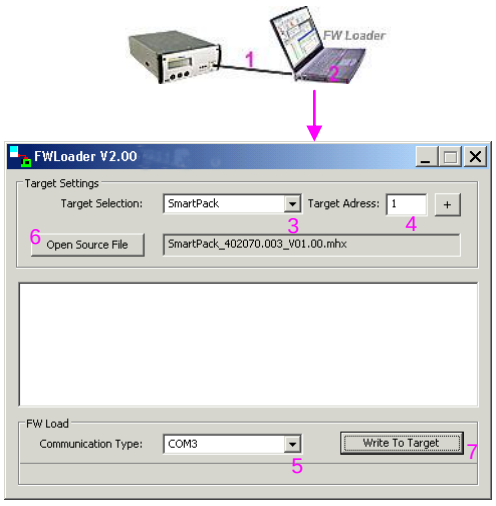


Figure 13
FWLoader dialog box

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.

Once the firmware has loaded, the *Smartpack* controller will automatically restart.

Firmware Upgrade - Controller's Embedded Web Adapter

You can use the "*Eltek Valere Network Utility*" program running on a PC to upgrade the firmware of the *Smartpack* controller's embedded Web Adapter. Read "Smartpack Controller — Ethernet" on page 23.

Use this utility program, "EVIPSetup.exe", to find your controller's firmware version, or access the controller's configuration pages in a web browser.

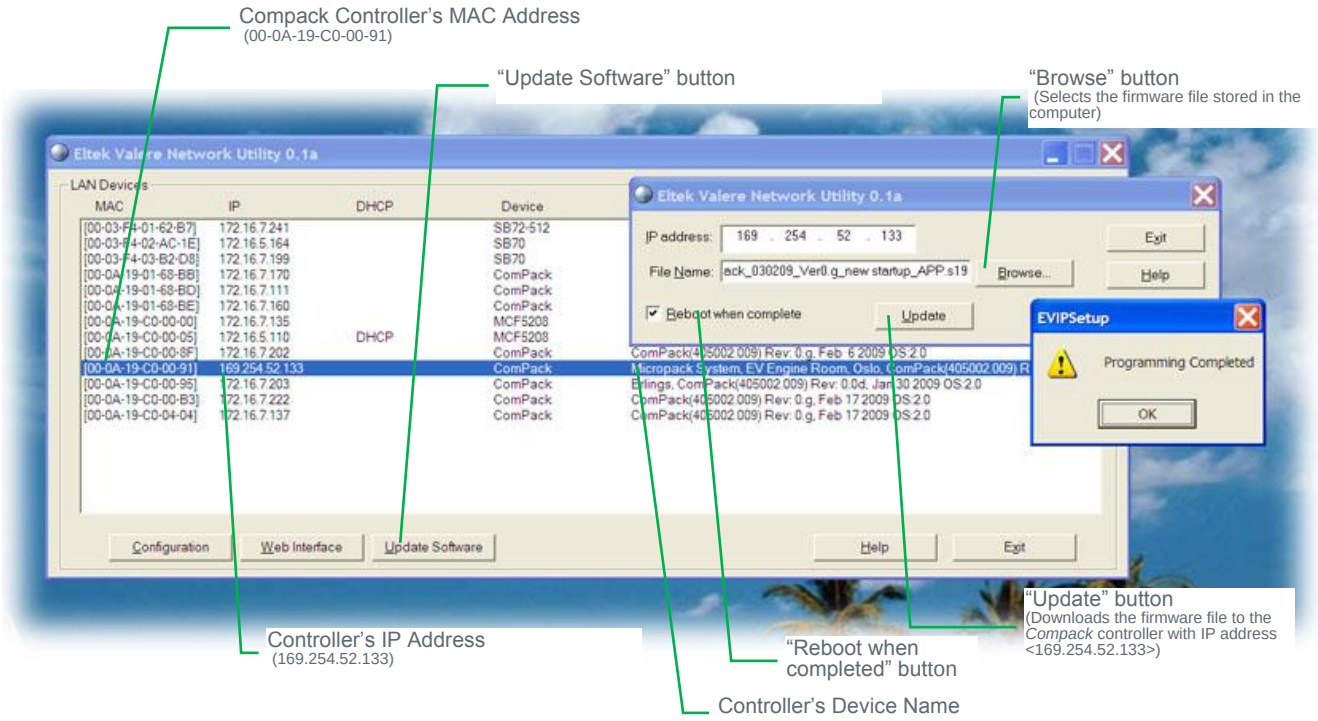
Do following:

1. **Connect a PC to the controller**
   Read chapter "Networking the Controller - Access Methods" page 25.
2. **Start the program *"EVIPSetup.exe",***
   on the computer;

   On the "*Eltek Valere Network Utility*" program:
3. **Select the controller**
   that you want to update; Check correct MAC address and IP address
4. **Click the "Update Software" button**

[2] You can get a copy of the FWLoader progam by contacting Eltek Valere's Service Dep.

5. **Click the "Browse" button,**
   and select the firmware file (s19-format) in the computer.
   The "Reboot when complete" check box must be checked (marked)
6. **Click the "Update" button**
   the utility will download and update the firmware to the controller with the selected IP address



(The "*Eltek Valere Network Utility*" program. Example of Compack controller's data)

While the firmware is downloaded to the controller, 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).

Technical Specifications - Controllers

Remote Monitoring and Control

- ✓ **From a PC running PowerSuite**
  a Windows-based communication program installed on a remote computer, the system can be monitored and controlled via modem or Ethernet network
- ✓ **From a PC running a WEB Browser**
  the system can be monitored and controlled via Ethernet network
- ✓ **From an NMS via Ethernet (SNMP)**
  With an SNMP agent connected to the Smartpack, the system can be monitored and controlled from a Network Management System (NMS) through Ethernet on Simple Network Management Protocol (SNMP)
- ✓ **Using alarm relays (voltage free contacts)**
  6/2 internal failsafe alarm relays provide voltage free contacts that can be connected to equipment used for traditional alarm monitoring

Local Monitoring and Control

- ✓ **From a PC running PowerSuite**
  a Windows-based communication software, can also communicate with the Smartpack through an USB serial or RS-232 cable
- ✓ **LCD and three keypads for local operations**
  If any alarm (major or minor) is activated, a (red or yellow) LED is lit in the front panel, the alarm text appears in the LCD and the corresponding alarm relay is activated

  In normal operation, the front LCD will display the output voltage, battery current, load current and charge mode. (Not on Basic Slave version)

Features

System
- Output Voltage Measurement
- Total Load Current Measurement
- Load/Battery Disconnect
- Alarm Level Settings (major / minor)
- Alarm Log (up to 1000 events, 10k on HW v2)
- Real Time Clock with Battery Backup
- Site Text/ID
- Test of Relay Outputs
- Voltage Level setup
- Data logging (up to 7000 data points)

Battery
- Battery Current Measurement
- Battery Temperature Measurement (optional)
- Battery Testing (acc. to discharge table or set time limit)
- Battery Test Information (10 latest tests)
- Setup of Battery Data
- Battery shunt setup
- Battery quality indication
- Battery Boost Charging
- Battery Cable Voltage Drop Compensation
- Temperature Compensated Charging
- Protection against Temperature Probe Failure

Rectifier
- Available information about each rectifier, e.g. serial
- number, version, internal temperature
- Individual Rectifier Current Measurement
- Individual Rectifier Input Voltage
- Efficiency Management

Available Alarms

All alarms can be set up with monitoring of minor, major, average and peak levels.

System
- Mains Failure (individual phases)
- Digital Inputs (programmable names)
- Load Disconnect (voltage or timer)
- Load Fuse
- Load Current

Battery
- High Battery voltage
- Low Battery voltage
- High Battery temperature
- Low Battery temperature
- Battery Capacity
- Battery Disconnect
- Battery Fuse
- Symmetry Failure
- Battery quality indication

Battery discharge current

Rectifier
- Rectifier Failure
- Critical Rectifier Failure (> 1, programmable)
- Rectifier Capacity w. programmable level
- Rectifier Current Limit
- Rectifier Overvoltage Protection
- Rectifier Current

Specifications

Input Voltage	24/48/60 VDC nominal system voltages
Dimensions (WxHxD)	109 x 44 (1U) x 140mm 4.3 x 1.7 x 5.5”

Specifications are subject to change without notice

242100.100.DS3– v7

Ordering Information

Part no.	Description
242100.110	Smartpack Extended (6 + 6 I/O, 2 String Battery connection)
242100.111	Smartpack RS-232 front (RS-232, 6 + 6 I/O, 2 String Battery connection)
242100.112	Smartpack RS-232 rear (RS-232, 6 + 6 I/O, 1 String Battery connection)
242100.113	Smartpack WEB/SNMP (Ethernet, 2 + 2 I/O, 2 String Battery connection)
242100.118	Smartpack WEB/SNMP (Ethernet, 6 + 6 I/O, 1 String Battery connection)
242100.000	Smartpack Basic Slave (without display, buttons & internal power for distributed systems)

Controller 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 offering remote control management via modem, Web, e-mail and SNMP.

Smartpack Controller — Standard

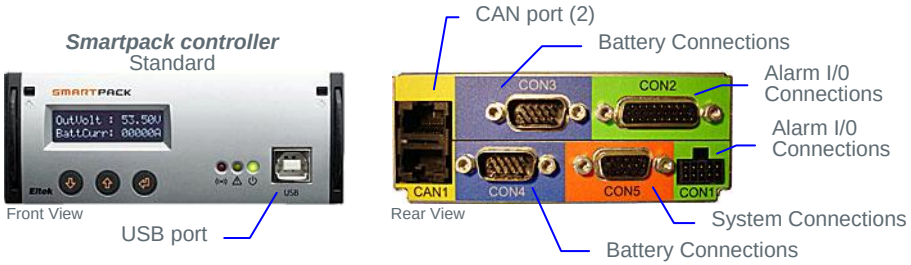


Figure 14 The standard Smartpack *controller. Front and rear connections*

The *Smartpack* controller – in standard option, Art 242100.110 – allows local monitoring and control via the module's front keys, LED lamps, LCD display and via a PC connected to the USB port.

The controller's functionality can be expanded by connecting several *Smartpack* controllers to the CAN bus (distributed DC power system). See Figure 3, page 8.

For more detailed description of connectors, see Figure 7, page 10.

Smartpack Controller — Basic Slave

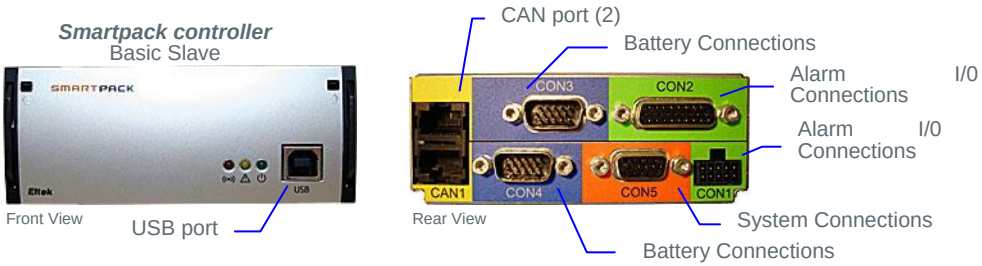


Figure 15 The Smartpack *controller Basic Slave. Front and rear connections*

The *Smartpack* controller Basic Slave, Art 242100.000, is a cost-effective module equipped with the same I/O connections and functionality as the *Smartpack's* Standard option, Art. 242100.110.

The only difference between the *Smartpack's* Standard and Basic Slave options is that the latter lacks LCD display, front keys and internal power supply.

The power system's *Smartpack* master controller supplies the Basic Slave modules with power via the CAN bus, and a maximum of two Basic Slave modules may be connected to the bus.

Both the master and the Basic Slave modules must run firmware 402073.009, version 2.0 or higher.

For information about connecting several *Smartpack* controllers to the CAN bus (distributed DC power system), take a look at Figure 3, page 8. For more detailed description of connectors, see Figure 7, page 10.

Smartpack Controller — Ethernet

The *Smartpack* controller – in "Ethernet & Battery Connections Option", Art 242100.113 and in "Ethernet & I/O Connections Option" Art 242100.118 – allows remote system monitoring and control via the Ethernet port, using TCP/IP network protocol. Connect a 10/100 Base T screened Ethernet cable to the Ethernet port.

The Ethernet plug-in-kit incorporates an embedded Web adapter, supporting Web/HTML interface, remote logon by *PowerSuite*, SNMP protocol (Get, Set, Traps) and e-mail alert via your network e-mail server. For description of the functionality provided by the embedded the Web adapter, read the *WebPower Adapter* manual, Art. 2019824.013.

Ethernet & Battery Connections Option

Figure 16 The Smartpack *controller, Ethernet & Battery Connections option*

The *Smartpack's* Standard and the Ethernet & Battery Connections option offer otherwise the same functionality, except for the Alarm I/O Connections on CON2, which are replaced by the Ethernet plug-in-kit.

Thus, the Ethernet & Battery Connections option supports fewer I/O connections -- four input circuits and four relay output circuits less than the standard option. See Figure 9, page 12.

Ethernet & I/O Connections Option

Figure 17 The Smartpack *controller, Ethernet & I/O Connections option*

The *Smartpack's* Standard and the Ethernet & I/O Connections option offer otherwise the same functionality, except for the Battery Connections on CON3, which are replaced by the Ethernet plug-in-kit.

Thus, the Ethernet & I/O Connections option supports fewer battery connections – seven input circuits less than the standard option. See Figure 8, page 11.

Smartpack Controller — RS232

The *Smartpack* controllers – in RS232 option, Art 242100.111 (front access) and Art 242100.112 (rear access) – allow remote system monitoring and control by connecting to the RS232 port either a modem or *Eltek Valere's* stand-alone *WebPower* unit (Ethernet support).

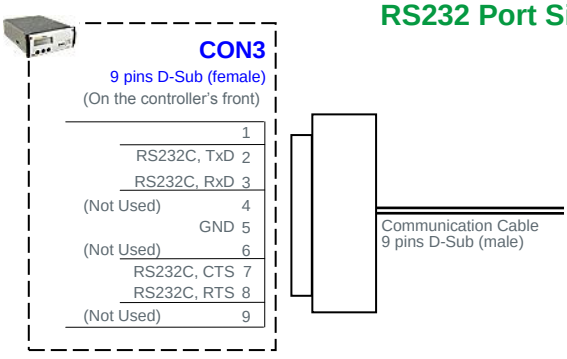
Figure 18 The Smartpack *controller, RS232 option, front. Front and rear connections*

The *Smartpack's* Standard and front-access RS232 options offer otherwise the same functionality.

Figure 19 The Smartpack *controller, RS232 option, rear. Front and rear connections*

The *Smartpack's* Standard and rear-access RS232 options offer otherwise the same functionality, except for the Battery Connections on CON3, which are replaced by the RS232 plug-in-kit.

Thus the rear-access RS232 module option supports fewer battery connections – seven battery monitoring input circuits less. See Figure 8, page 11.



The RS232 ports on the front-access and the rear-access module options are electrically identical.

Connect an end of the RS232 cable to the *Smartpack's* RS232 port, and the other end to the modem's or *WebPower's* RS232 port.

Verify that both units have the same communication parameters (Baud rate, parity, etc.)

Figure 20 RS232 port signals

4. Networking the Controller - Access Methods

This chapter describes how to access the power system controller — *Compack* or *Smartpack*[3] — from a computer, to configure and operate the DC power supply system.

After accessing the controller, you can read chapter "Configuring & Monitoring the Power System", page 40. For more detailed description of configuration options, refer to *WebPower Online Help* or *PowerSuite Online Help*.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

You can access the controller using a standard computer, which is either connected to an existing LAN or directly connected to the controller.

Figure 21 Example of controller's access via LAN and via a stand-alone computer

Controller's Default Networking Data

Each controller is shipped with a unique Eltek Valere MAC address (Media Access Control) stored inside the controller and marked on the controller's label.

The controllers — *Compack* or *Smartpack*** — have by default the Dynamic Host Configuration Protocol (DHCP) enabled. 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: The controller is shipped without a fixed IP address (IPv4). Only *Smartpack* controllers with firmware version older than 4.2 are shipped with the fixed IP address <192.168.10.20>.

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 (*Compack* or *Smartpack*) to the LAN, and get Web browser access to the controller from your networked computer.

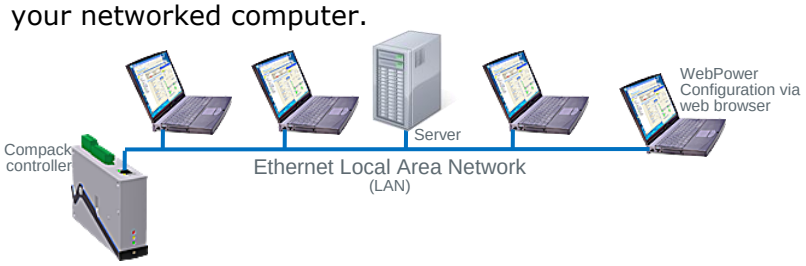


Figure 22 Example of controller's access from a computer connected a LAN

Requirements

- Computer correctly configured and connected to the LAN
- Standard Ethernet cable (straight through cable),
  to connect the controller to the LAN
- "*Eltek Valere Network Utility*" program,
  that you can download with the controller's firmware from
  www.eltekvalere.com

Contact your LAN administrator, if your computer has difficulties accessing the network.

[3] The graphics show *Compack* controllers, but applies also to *Smartpack* controllers

In Short

To get access to the controller via your LAN networked computer, just connect the controller to the LAN, which will automatically assign an IP address to the controller. Using the "*Eltek Valere 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 the next chapter):

1. Start the "Eltek Valere Network Utility" program
2. Connect the controller to the LAN
3. Identify the controller in the "*Eltek Valere Network Utility*" program
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

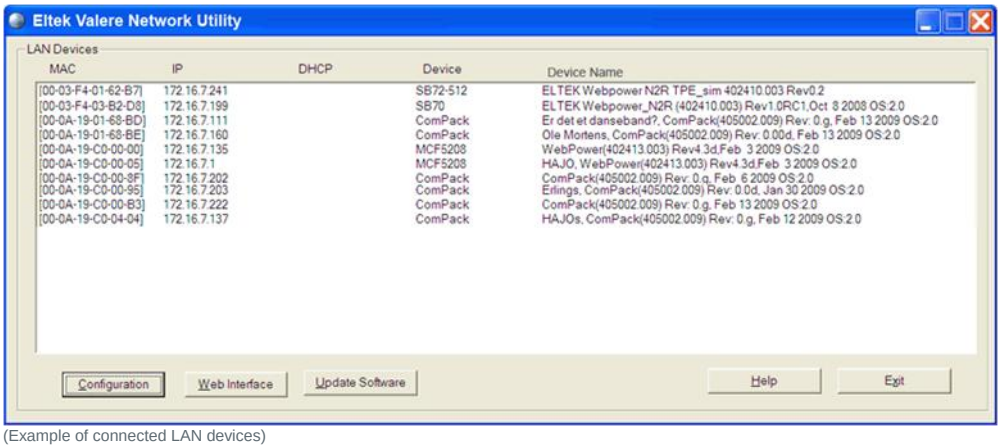
For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

Read also chapter "Controller's Default Networking Data", page 25.

More Detailed

Carry out the following steps to access the controller via the Ethernet LAN:

1. **Start the "*Eltek Valere 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.



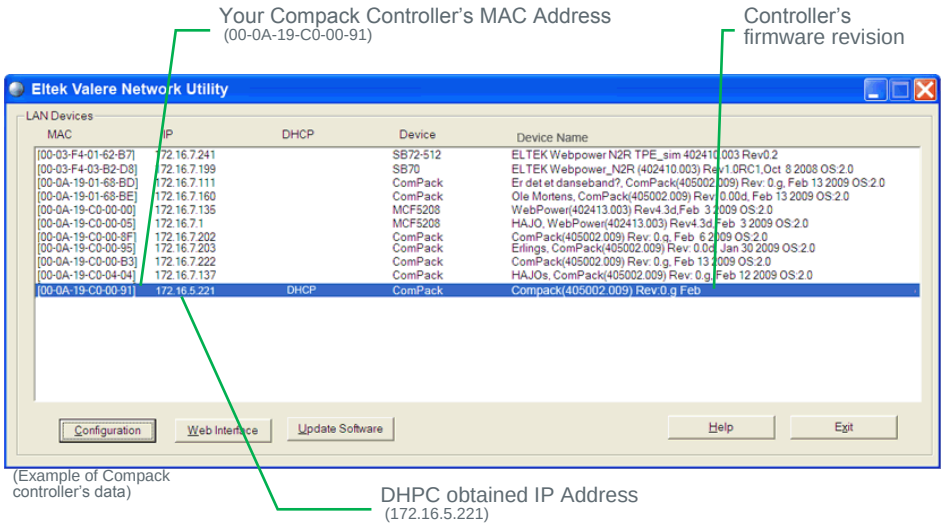
(Example of connected LAN devices)

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. See "Figure 22", page 25.

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

3. **Identify the controller in the "*Eltek Valere Network Utility*" program**
   by looking 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

   Note that it can take up to 1 minute before the connected controller (*Compack* or *Smartpack*) is displayed in the utility program.



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).

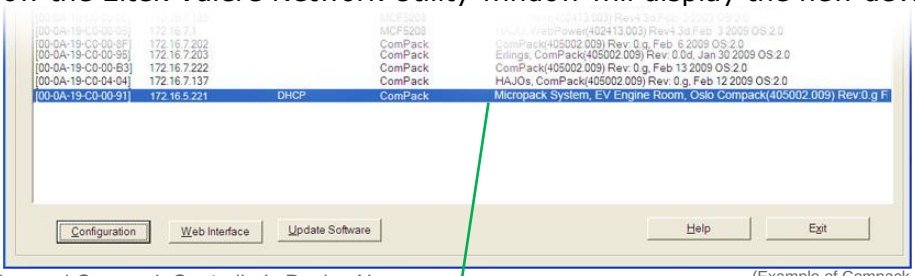
   Note that the Web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation.
   Read chapter "How To Enable Pop-ups in the browser — Internet Explorer", page 33.

   For security reasons, it is advisable to change the default passwords with your own passwords.
   Read chapter "How to Change WebPower's Default Log in Passwords", page 34.

6. **Change the controller's Device Name by,**
   — 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 chapter "How To Change the Controller's Device Name", page 37.

   Now the Eltek Valere Network Utility window will display the new device name.



Controller Access — Via Stand-alone PC

If a Local Area Network (LAN) is not available, you can also access the controller (*Compack* or *Smartpack*[4]) directly from a stand-alone computer.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

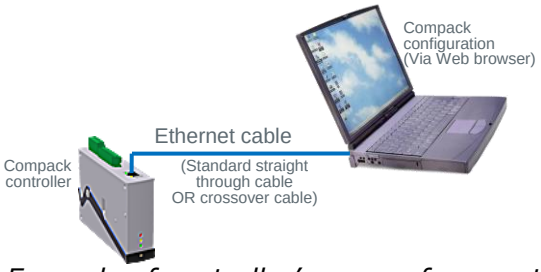


Figure 23 Example of controller's access from a stand-alone PC

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)

**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.

Contact your IT Department, if your computer has difficulties while installing or configuring the network card. Also, read chapter "How To Check the Status of your LAN Network Card (NIC)", page 38.

[4] The graphics show *Compack* controllers, but applies also to *Smartpack* controllers

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.

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>.

For the computer to be able to access the controller, both devices need to have different IP addresses, but in the same range. As the computer's NIC IP address is now e.g. <169.254.52.132>, so reconfiguring the controller's IP address from e.g. <0.0.0.1> to e.g. <169.254.52.133> will 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 next chapter):

1. Start the "Eltek Valere 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 range 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.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

Read also chapter "Controller's Default Networking Data", page 25.

More Detailed

Carry out the following steps to access the controller via a stand-alone computer:

1. **Start the "*Eltek Valere 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.

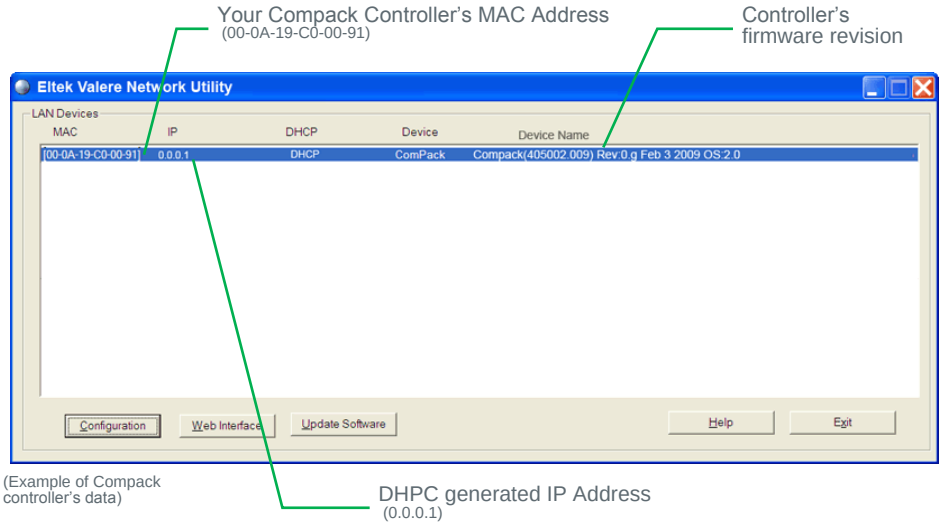
   Notice that if the computer has installed wireless Ethernet Network Interface Cards, they should not be active; otherwise the Eltek Valere Network Utility may display LAN devices accessed wireless.

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 on its top, and the other end to the computer's NIC.

   The controller automatically generates an IP address, e.g. <0.0.0.1>, and the Eltek Valere Network Utility displays the controller as a connected LAN device (may take up to 1 minute to display).

   Notice that the displayed IP address may differ from above, if a Static IP address has been previously enabled and stored in the controller.

   Check that the displayed MAC address corresponds to the MAC address label on the controller.



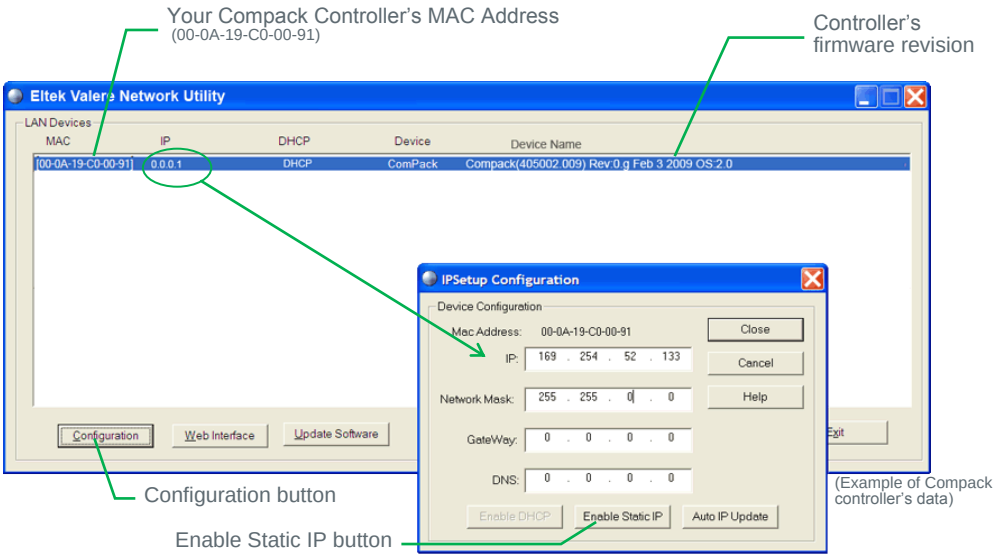
3. **Find the NIC's IP address and subnet mask used by the computer by,**
— Opening the computer's Network Connections window
— Selecting the actual network card (NIC) and
— Making a note of the IP address and Subnet mask displayed in the Details panel, on the left side of the window.
E.g. IP address: <169.254.52.132>, Subnet mask: <255.255.0.0>

   Read chapter "How To Check the Status of your LAN Network Card (NIC)", page 38.

   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 range as the computer's by,**
   — Selecting the controller in the Eltek Valere Network Utility window
   — Clicking on the Configuration button, to open the "IPSetup Configuration" window
   — Changing the IP address from, e.g. <0.0.0.1> to e.g. <169.254.52.133>
   — 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 and Subnet masks are in the same range 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>



   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).

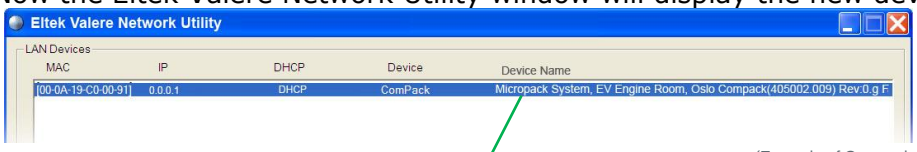
   Note that the Web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation.
   Read chapter "How To Enable Pop-ups in the browser — Internet Explorer", page 33.

   For security reasons, it is advisable to change the default passwords with your own passwords.
   Read chapter "How to Change WebPower's Default Log in Passwords", page 34.

7. **Change the controller's Device Name by,**
   — 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 chapter "How To Change the Controller's Device Name", page 37.

   Now the Eltek Valere 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)

TIPS:
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.

Read chapter "How To Check the Status of your LAN Network Card (NIC)", page 38.

How Tos

This chapter describes the steps required to perform certain useful tasks, such as:

- How To Enable Pop-ups in the browser — Internet Explorer
- How to Change WebPower's Default Log in Passwords
- How To Change the Controller's Device Name
- How To Check the Status of your LAN Network Card (NIC)

How To Enable Pop-ups in the browser — Internet Explorer

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.

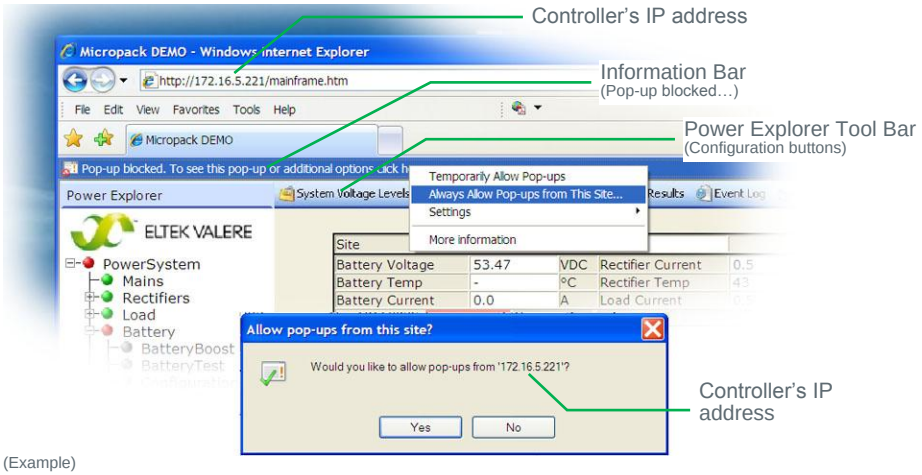
Internet Explorer and other Web browsers usually have the Pop-Up Blocker feature enabled, thus stopping annoying pop-up ads and pop-up windows while "surfing" the Internet.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

This chapter 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

To view the controller's[5] 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)

For security reasons, it is advisable to log in with the "admin" account (case sensitive) and change the default passwords with the passwords of your choice.

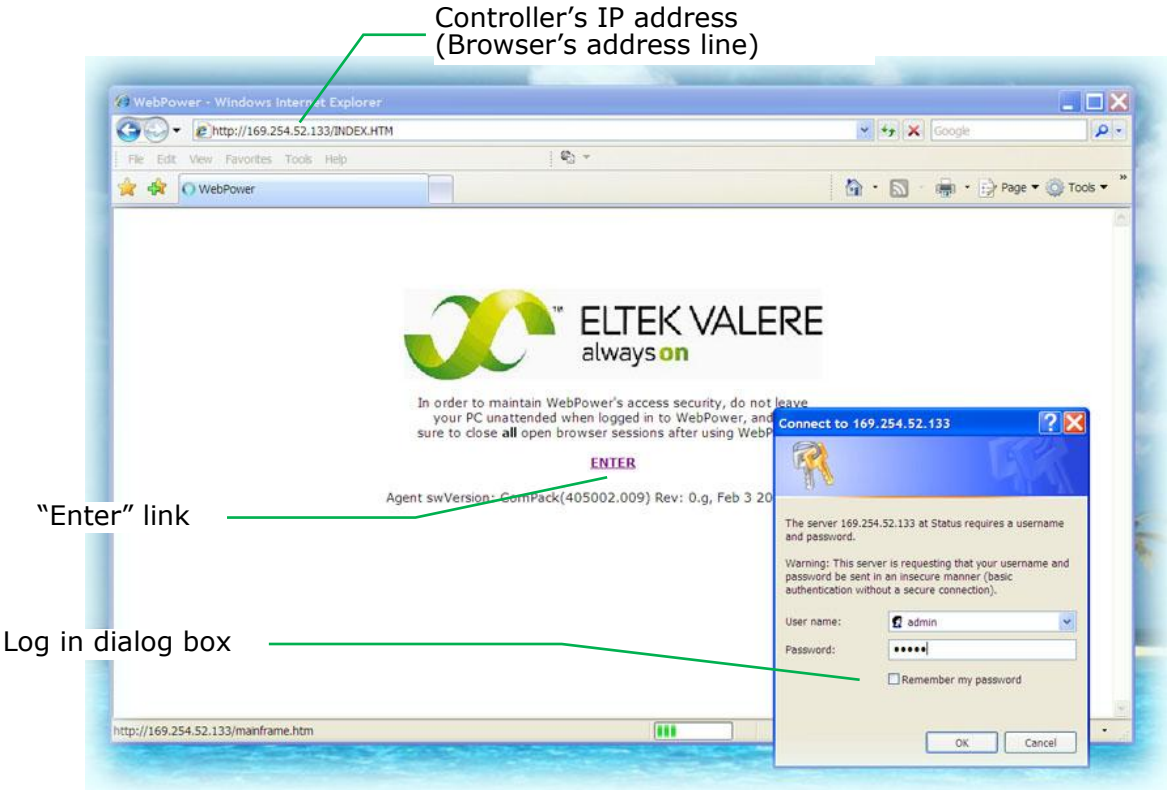
For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

Carry out the following steps to change the passwords in 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).

[5] The graphics show *Compack* controllers, but applies also to *Smartpack* controllers

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.



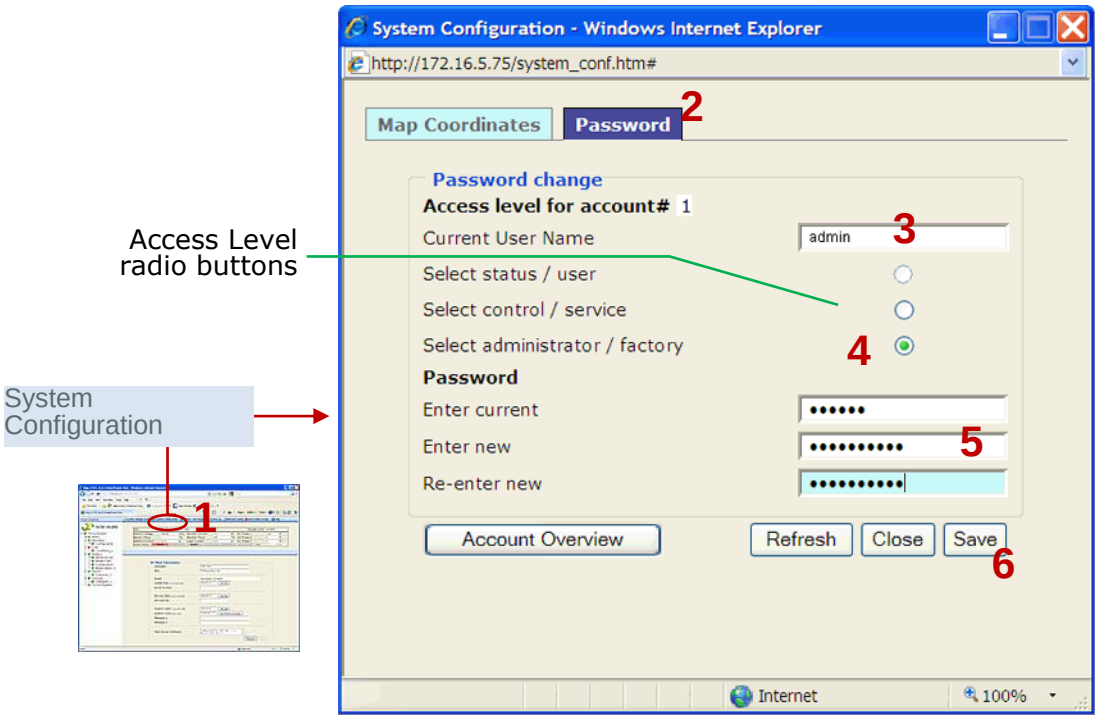
(Example of controller's configuration pages)

Note that the Web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation.
Read chapter "How To Enable Pop-ups in the browser — Internet Explorer", page 33.

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 Change the Controller's Device Name

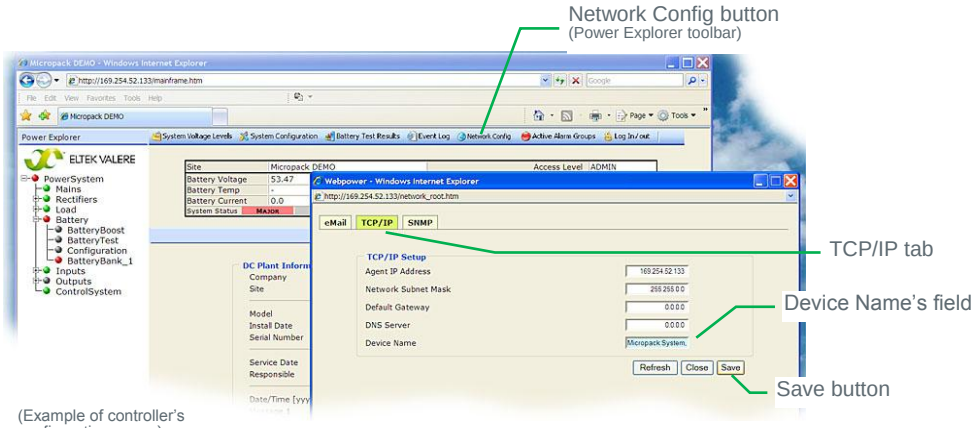
In order to facilitate identification of the power system when connected a LAN, it is advisable to log in with the "admin" account and give the system controller[6] a Device name of your choice.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

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 chapter "How To Enable Pop-ups in the browser — Internet Explorer", page 33.
3. **Change the controller's Device Name by,**
   — 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 Valere Network Utility window will display the new device name.

[6] The graphics show *Compack* controllers, but applies also to *Smartpack* controllers

How To Check the Status of your LAN Network Card (NIC)

This chapter describes how to check your NIC's IP address, when the computer is running the MS Windows operating system.

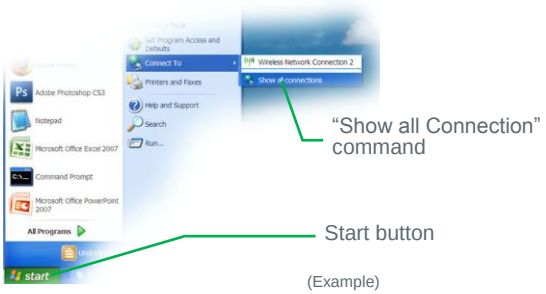
You can always check the IP address, subnet mask, status, etc. of your personal computer's network card (NIC), by opening the "Network Connections" window and looking at the Detail pane on the left side of the window.

Notice that you can also get this information by opening a DOS window and running the command "IPCONFIG".

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

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"



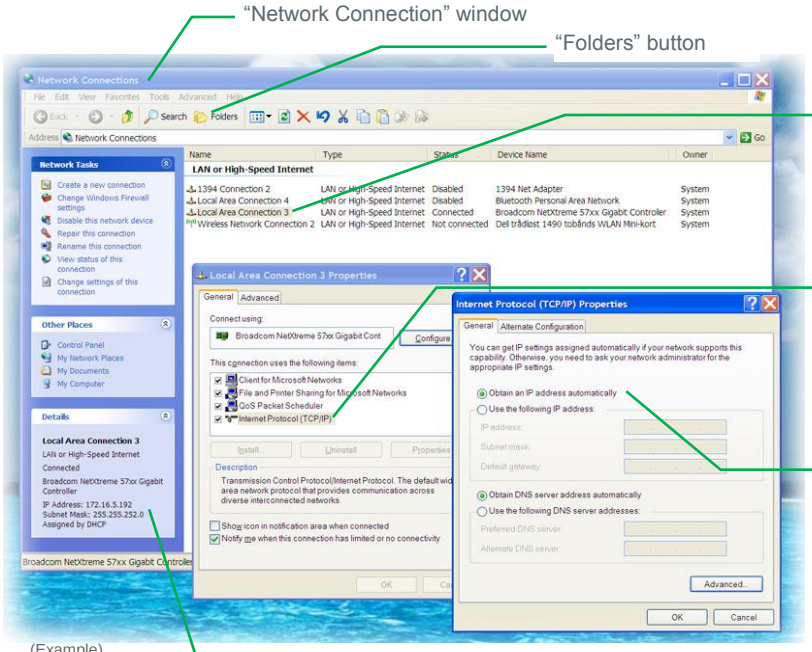
(Example)

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>



(Example)

5. Configuring & Monitoring the Power System

This chapter describes the available methods to configure and monitor the DC power supply system from a computer.

For more detailed description of configuration options, refer to *WebPower Online Help* or *PowerSuite Online Help*.

Before configuring and monitoring the power system, the computer must be able to access the controller, which is described in chapter "Networking the Controller", on page 25.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

You can configure and monitor the DC power supply system from a computer — connected to a LAN or directly connected to the controller[7] — 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.

- **Via PowerSuite application.**
  The powerful *PowerSuite* application must be installed in the computer.

- **Via Network Management System (NMS)**
  The NMS hardware and software must be installed in the network.

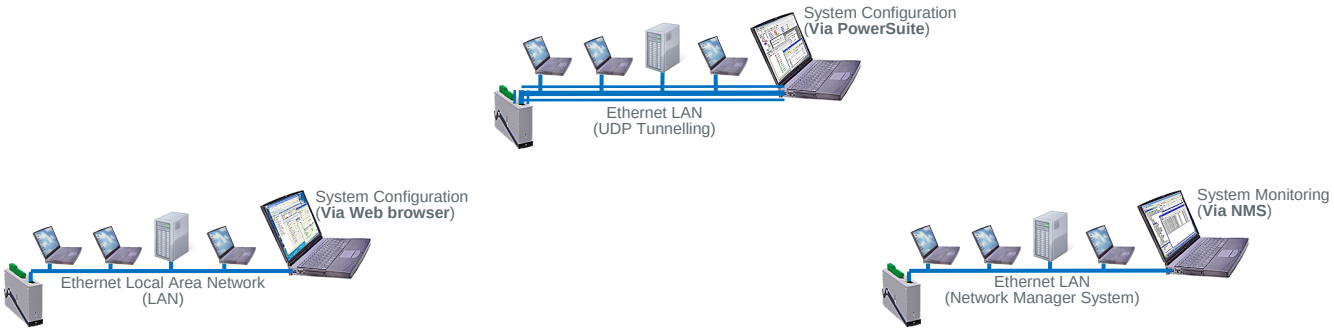


Figure 24 Power system configuration via Web browser, PowerSuite and NMS.

[7] The graphics show *Compack* controllers, but applies also to *Smartpack* controllers

Configuration — via Web Browser

You can configure and monitor the DC power supply system from a computer — connected to a LAN or directly connected to the controller — using a standard Web browser to access the configuration pages stored in the controller[8].

You do not need to install any programs in the computer.

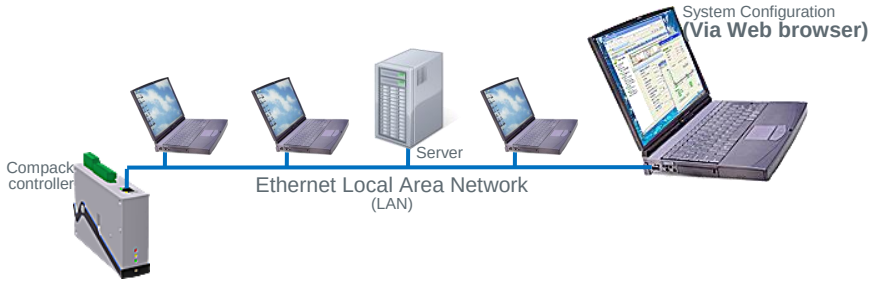


Figure 25 Power system configuration via Web browser.

For information about how to access the configuration pages stored in the controller, read chapter "How to Change WebPower's Default Log in Passwords", page 34.

For more detailed description of configuration options, refer to *WebPower Online Help* or *PowerSuite Online Help*.

Configuration — via PowerSuite Application

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 powerful *PowerSuite* application.

You need to install the *PowerSuite* application in the computer.

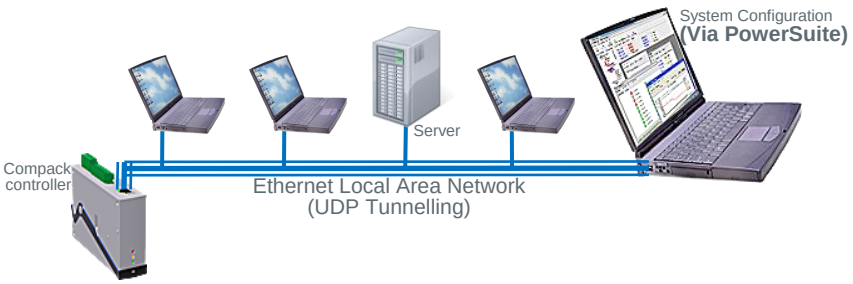


Figure 26 Power system configuration via PowerSuite application.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

The *PowerSuite* application is originally developed for USB serial connection between the computer and the controller, using the pComm protocol.

When the controller is not equipped with an USB serial port — as is the case with the *Compack* controller — you can still use the *PowerSuite* application via an Ethernet LAN, using the UDP tunnelling protocol. *PowerSuite*'s pComm protocol is then embedded in the LAN's IP protocol.

[8] The graphics show *Compack* controllers, but applies also to *Smartpack* controllers

In Short

To use *PowerSuite* to configure the power system via an Ethernet LAN connection, just connect the controller to the LAN. Using the "*Eltek Valere Network Utility*" program, identify the controller and make a note of its IP address. Start *PowerSuite* in your LAN connected computer, click on the "Connect" button and in the Site Manager dialog box create a new Network site with the controller's IP address.

The "Configuration — via PowerSuite Application" procedure involves following steps (as described in more detail in the next chapter):

1. Start the "Eltek Valere Network Utility" program
2. Connect the controller to the LAN
3. Identify the controller in the "*Eltek Valere Network Utility*" program
4. Start the *PowerSuite* application in your computer (connected to the LAN)
5. In *PowerSuite*'s Site Manager, create a new Network site for the controller

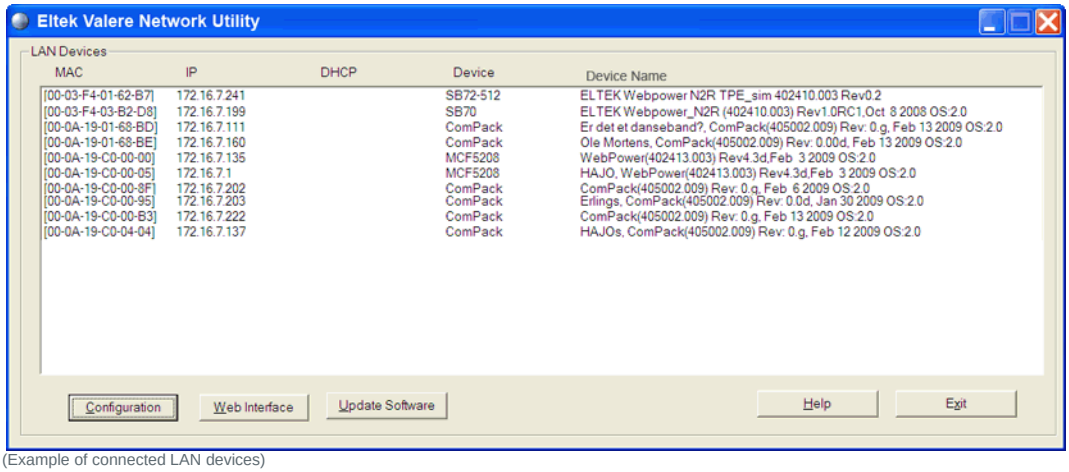
For more detailed description of configuration options and other advanced networking services implemented by the controller, click any time on the *PowerSuite*'s Help buttons to browse and search through *PowerSuite Online Help*. Also, refer to *WebPower Online Help*.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

More Detailed

Carry out the following steps to use *PowerSuite* via an Ethernet LAN connection:

1. **Start the "*Eltek Valere Network Utility*" program**
   by opening the file "EVIPSetup.exe", which will display already connected LAN devices. The controller[9] will be displayed after connection to the LAN.



(Example of connected LAN devices)

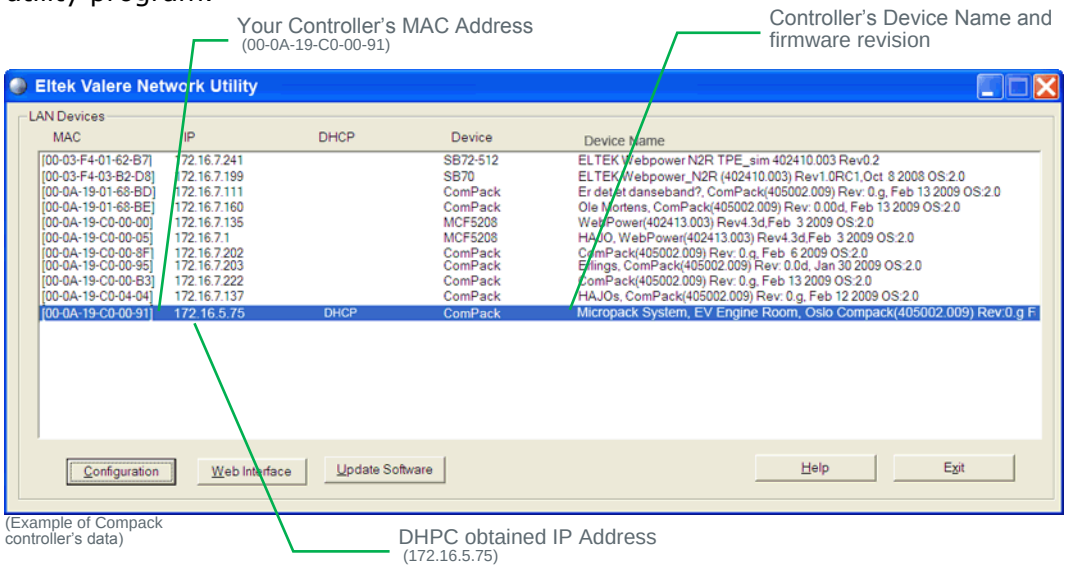
2. **Connect the controller to the LAN**
   plugging one end of a standard Ethernet cable (straight through Ethernet cable) to the controller's RJ-45 socket, and the other end to one of the LAN's available RJ-45 sockets. See "Figure 22", page 25.

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

[9] The graphics show *Compack* controllers, but applies also to *Smartpack* controllers

3. **Identify the controller in the "*Eltek Valere Network Utility*" program**
by looking 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.



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

4. **Start the PowerSuite application in your computer by,**
(The computer has to be connected to the same LAN as the controller.)

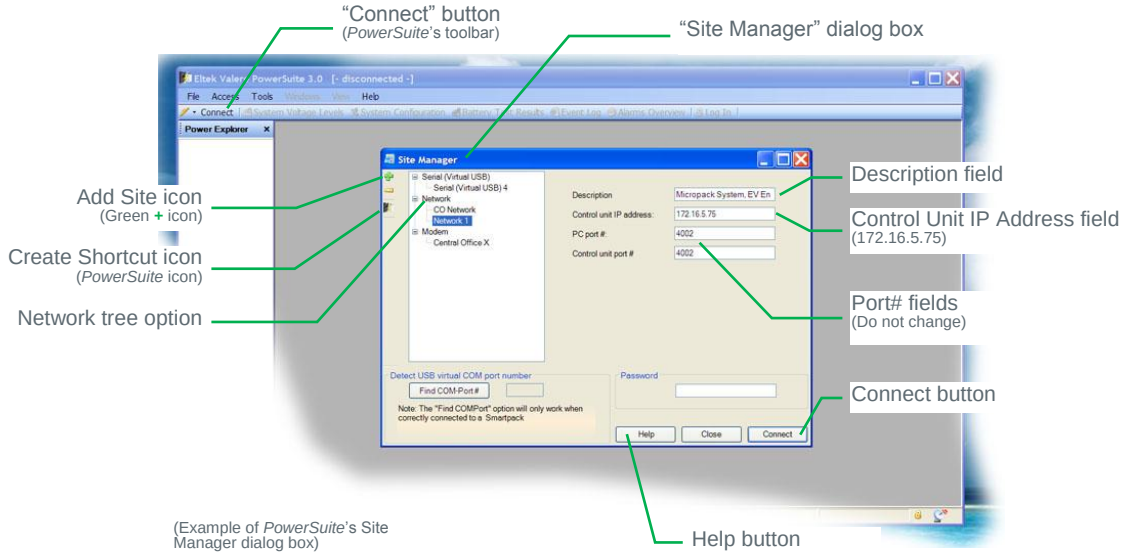
— Selecting from the Start menu, in MS Windows:
"Start > All Programs > Eltek Valere > PowerSuite"

OR
— Clicking on the *PowerSuite* icon on your computer's desktop

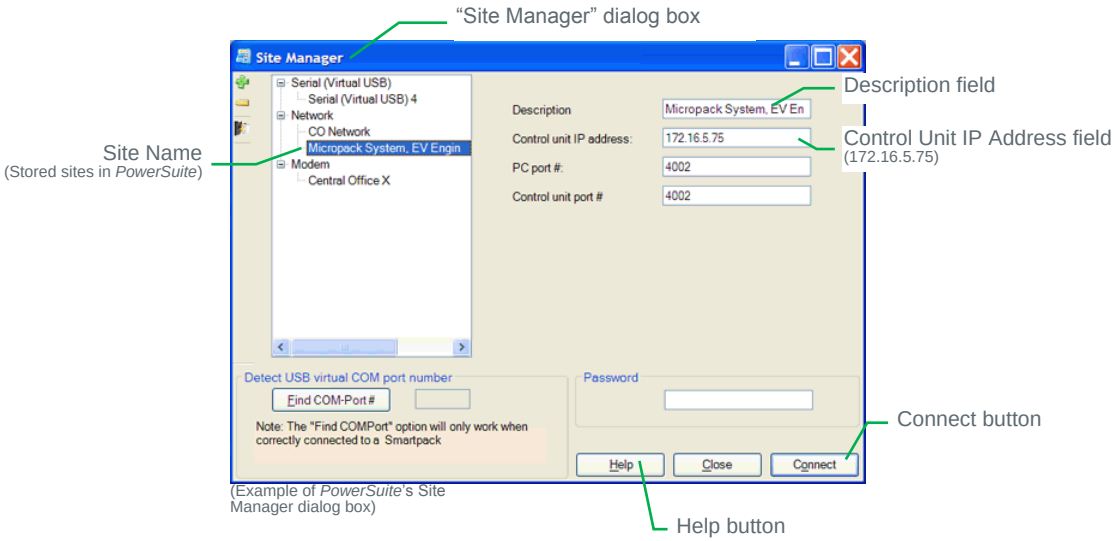
5. Create and save a new Network Site for the controller by,
Carrying out the following:
— Click on the "Connect" button, on the *PowerSuite* toolbar
— Click on the "Network" tree option on the Site Manager dialog box
— Click on the Add Site icon (green **+**)
— Edit the "Description" field.
E.g. enter 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



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.



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's 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.

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.

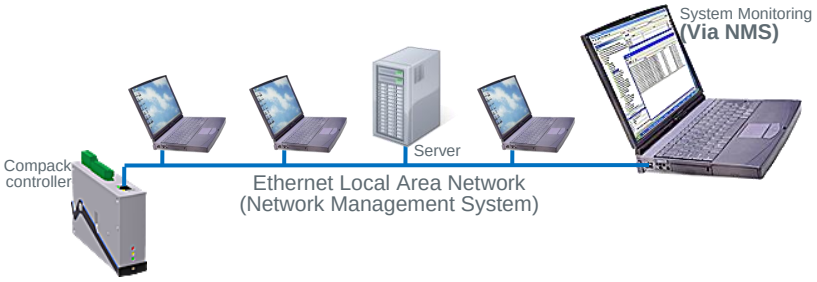


Figure 27 Power system remote monitoring via NMS.

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

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 Valere'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 *Compack* and *Smartpack* 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 (as described in more detail in the next chapter):

Controller's SNMP configuration:
(Refer to chapter "More Detailed - Controller SNMP Configuration" on page 46")

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

NMS configuration:
(Refer to the NMS manuals for accurate instructions)

1. Compile the Eltek Valere's device specific MIB files into the NMS database
   (Read chapter "About Eltek Valere's SNMP MIB Files", page 49)

2. Add the controller object — *Compack* or *Smartpack* — to the Management Map
   (See an example of the *Compack* controller object added to the Management Map, in chapter "Example — NMS Configuration", page 50.)

3. "Ping" the controller to ensure connectivity
4. Define and configure the TRAP event handling, as required

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

More Detailed - Controller SNMP Configuration

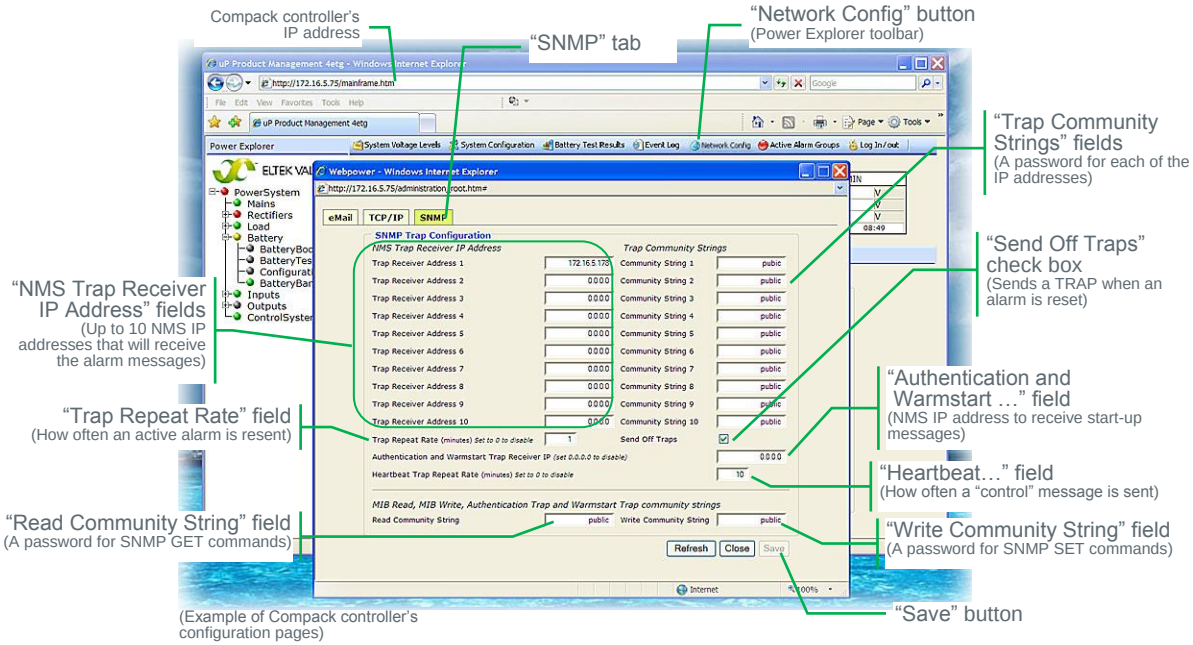
Carry out the following steps to configure the *Compack* or *Smartpack* controller's SNMP agent:

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 chapter "How to Change WebPower's Default Log in Passwords", page 34.

   Note that the Web browser must have the Pop-ups function enabled, as the configuration web pages employs Java script navigation.
   Read chapter "How To Enable Pop-ups in the browser — Internet Explorer", page 33.

3. Configure the Compack or Smartpack controller's SNMP agent by,

— 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



"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[10] 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.

"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.

[10] 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.

"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[11] 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.

"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.

[11] 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.

About Eltek Valere's SNMP MIB Files

The *Eltek Valere's* device specific MIB files[12] (Management Information Base) contain device description data, which is used by other SNMP requester devices in the Network Management System (NMS).

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

The MIB files are in the plain-text, DOS End-of-Line format, and conform to the ASN1 coding syntax.

Eltek Valere'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 Valere* SNMP MIB files:

- The "**First-Time Installation Type**" MIB files.
  Describe a complete MIB tree structure (root and a branch) for *Eltek Valere* SNMP devices.
  Use this type of MIB file if your NMS MIB tree does NOT already contain an *Eltek Valere* SNMP MIB tree structure.
- The "**Root Type**" MIB files.
  Describe the *Eltek Valere* MIB tree base or root (no branches for SNMP devices).
  Use this type of MIB file if you want to use several *Eltek Valere* Branch MIB files simultaneously as branches in the NMS MIB tree.
- The "**Branch Type**" MIB files.
  Describe the *Eltek Valere* MIB tree branches for SNMP devices (no root).
  Use this type of MIB file if you already have the *Eltek Valere* MIB tree root compiled in the NMS MIB tree.
  You can compile several *Eltek Valere* Branch MIB files in the NMS MIB tree, thus describing different *Eltek Valere's* SNMP compliant devices (equipment).

Following table is an overview of some of the *Eltek Valere* SNMP MIB files, their MIB file type and the equipment they describe:

MIB File Type	MIB File Name	Described Eltek Valere Equipment
Root	Eltek_Root.MIB	Top file for all Eltek Valere 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

[12] You can visit www.eltekvalere.com to download *Eltek Valere's* device specific MIB files, or contact Eltek Valere's Service Dep.

Example — NMS Configuration

After completing the controller's SNMP configuration — see chapter "More Detailed - Controller SNMP Configuration", page 46 — 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.)

For acronym descriptions, refer to chapter "Glossary", page 66 (rear cover page).

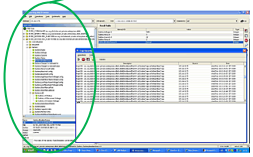
Follow these general steps to configure the Network Management System:

1. Compile the *Eltek Valere*'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 Valere's SNMP MIB Files", page 49)

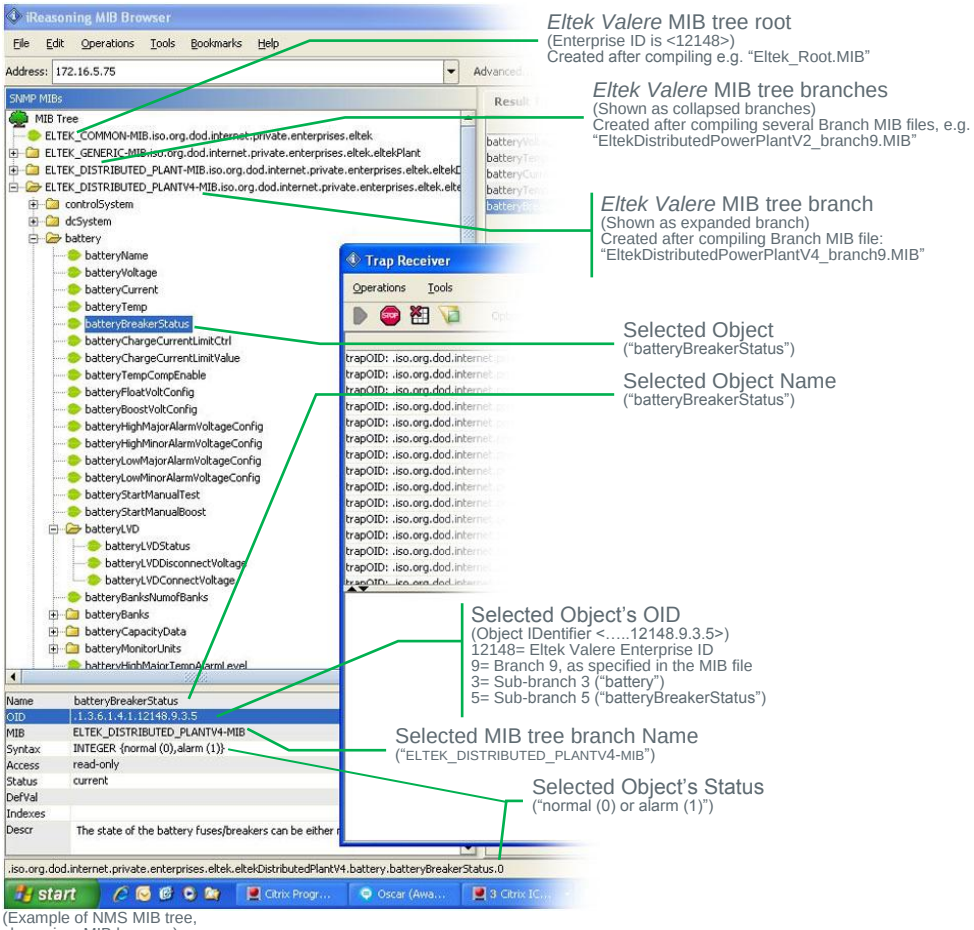
2. Add the controller object — *Compack* or *Smartpack* — to the Management Map
   (The figure below is an example of the *Compack* controller object added to the Management Map.)

3. "Ping" the controller to ensure connectivity
4. Define and configure the TRAP event handling, as required

Eltek Valere's unique Enterprise ID is <12148>



(Example of NMS MIB tree, shown in a MIB browser)



(Example of NMS MIB tree, shown in a MIB browser)

6. CAN Bus Nodes – Options

The CAN Bus Nodes are control units connected to the power system's CAN bus. They have dedicated inputs and outputs that expand the system monitoring.

Key Features

The CAN Bus Nodes have a rugged sealed-plastic design, with DIN-rail or Velcro tabs as standard mounting options.

When the CAN bus address is configured and the unit connected to the bus, it will automatically communicate with the *Smartpack* controller ("plug and play").

Smartnode Control Unit

The *Smartnode* module is a software protocol translator. It can be customized to enable the *Smartpack* controller to communicate with third-party equipment using specific RS232 and RS485 serial protocols.

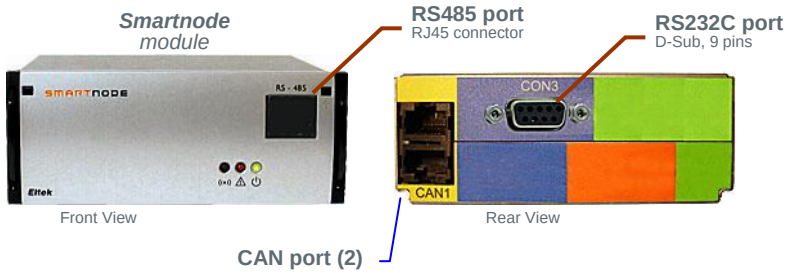


Figure 28 The Smartnode *module. Front and rear connections*

The example in Figure 29 shows schematics of how the *Smartpack* controller can communicate with external equipment with specific protocols, using the *Smartnode* as a protocol translator.

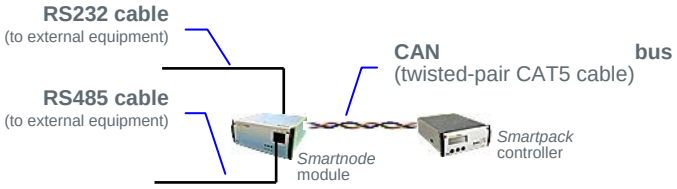


Figure 29 The Smartpack *controller communicating with the* Smartnode *module*

Battery Monitor

The *Battery Monitor CAN Bus Node* enables you to decentralize and increase the number of battery symmetry measurements in your *Smartpack* based DC power supply system. Also, it monitors the battery compartment temperature – using the built-in sensor – the battery fuse – with a fuse monitoring input – and the battery current – via a current sense input.

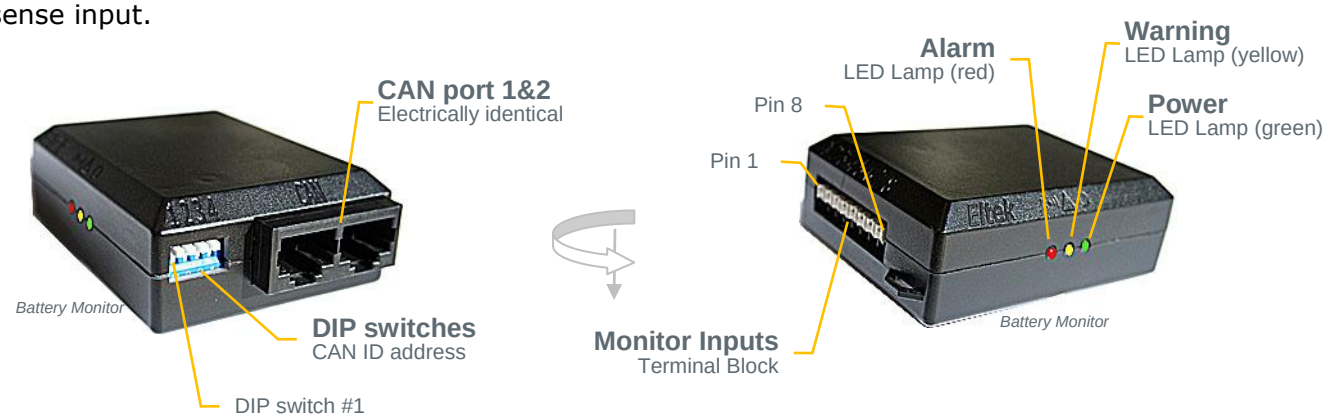


Figure 30 Location of terminals, DIP switches, CAN ports and LED indicators in the Battery Monitor

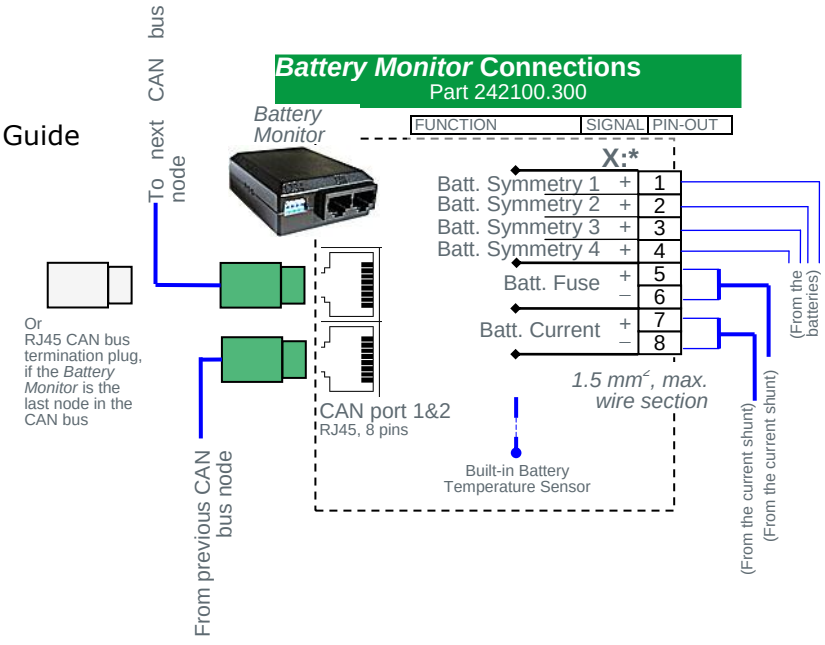
Battery Monitor	
Inputs	○ 4x Symmetry Voltage ○ 1x Configurable (Fuse failure) ○ 1x Current sense
Accuracy based on resolution (calibrated)	○ Voltage: 76mV ○ Current (200A): +/- 1A
Functionality	○ Symmetry measurement 2, 6, 12, 24, 30 or 36V ○ Fuse failure NO, NC or Diode Matrix ○ Current sense 50mV or 60mV shunt ○ Temperature measurement Embedded in unit
SW Part number	402086.009
Max. CAN Power consumption	90mA

Specifications are subject to change without notice
242100.CAN.DS3 – v2(part)

Figure 31 Technical Specification Battery Monitor and Connection Drawing

For additional specifications, read chapter "Technical Specifications — CAN Bus Nodes" on page 56.

Read also the "Installation Guide Battery Monitor CAN Node", document 351507.033.



Load Monitor

The *Load Monitor CAN Bus Node* enables you to decentralize and increase the number of input fuse monitoring and current sense signals in your *Smartpack* based DC power supply system. The fuse monitoring inputs are suitable for monitoring a wide range of breakers in both positive and negative DC distributions.

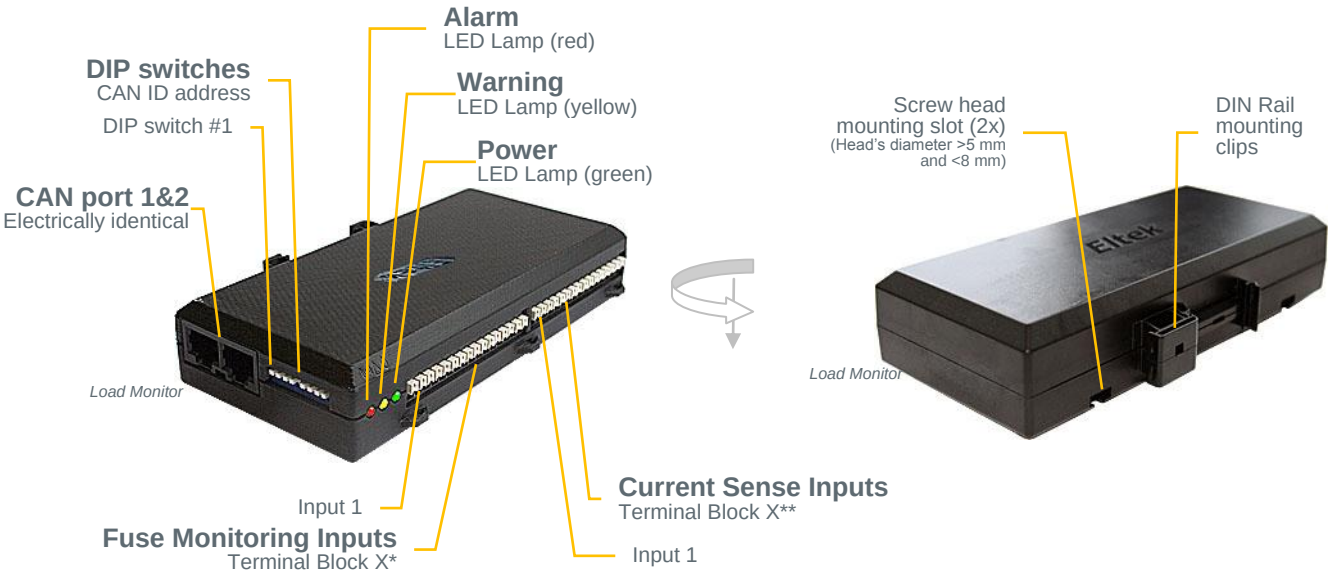
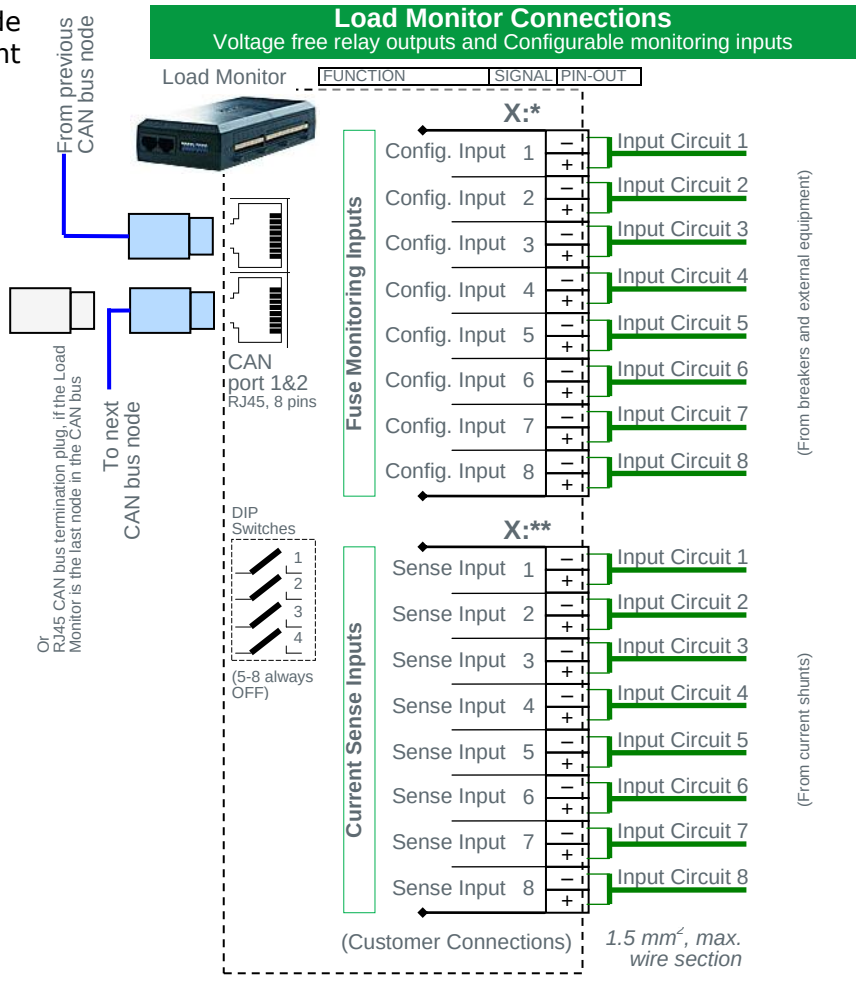


Figure 32 Location of terminals, DIP switches, CAN ports and LED indicators in the Load Monitor

Read also the "Installation Guide Load Monitor CAN Node", document 351506.033.

Figure 33 Technical Specification Load Monitor and Connection Drawing

For additional specifications, read chapter "Technical Specifications — CAN Bus Nodes" on page 56.



Load Monitor	
Inputs	○ 8x Configurable (Fuse failure) ○ 8x Current sense
Accuracy based on resolution (calibrated)	Current (200A): +/- 1A
Functionality	○ Fuse failure NO, NC or Diode Matrix ○ Current sense 50mV or 60mV shunt
SW Part number	402087.009
Max. CAN Power consumption	120mA

Specifications are subject to change without notice
242100.CAN.DS3 – v2(part)

I/O Monitor

The *I/O Monitor CAN Bus Node* enables you to decentralize and increase the number of input monitoring and output controlling signals in your *Smartpack* based DC power supply system. Also, it monitors and controls the compartment temperature inside fan-cooled outdoor cabinets.

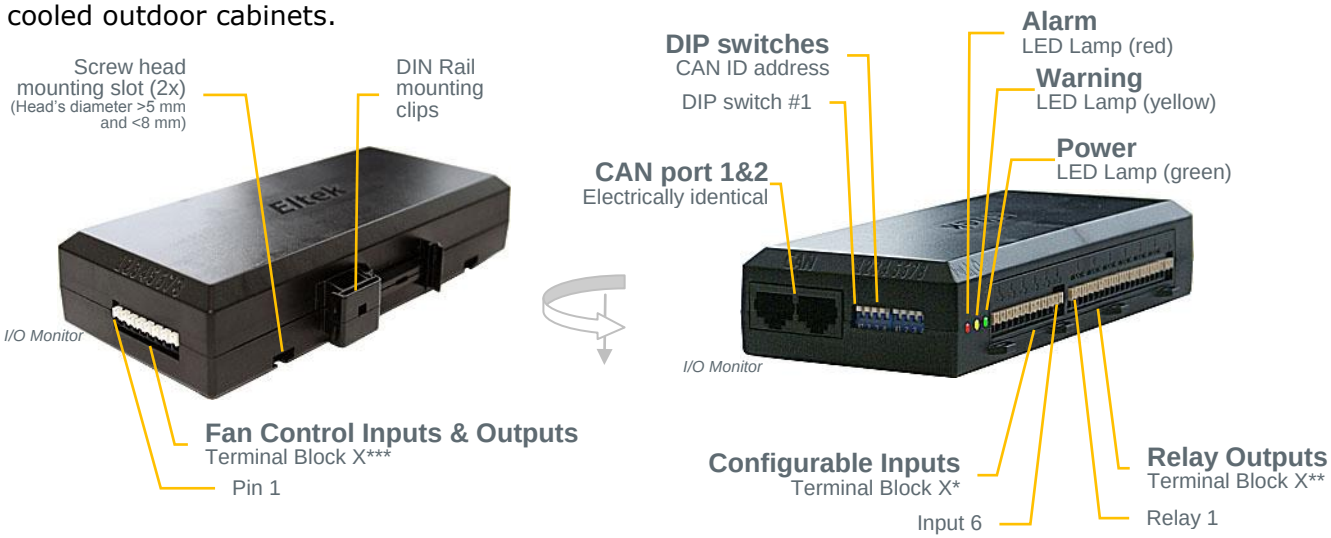


Figure 34 Location of terminals, DIP switches, CAN ports and LED indicators in the I/O Monitor

Figure 35 Technical Specification I/O Monitor

I/O Monitor (Outdoor)	
Inputs	○ 6x Configurable ("digital") ○ 2x Tacho ○ 2x Temperature probe
Outputs	○ 6x Relay – Dry/Form C 4x signal 1A /60V [no. 1,2,3,4] 2x power 5A /60V [no. 5,6] ○ 2x Analogue linear (Max. 0-10V)
Functionality	○ Relay Alarming Normally activated or deactivated ○ Configurable inputs NO, NC or Diode Matrix ○ Climate control Fan speed regulation and monitoring ○ Data logging (non-volatile memory) 10000 time stamped logs 4 user selectable data points Default: 2x Temp. 2x Fan Speed
SW Part number	402088.009
Max. CAN Power consumption	160mA

Specifications are subject to change without notice
242100.CAN.DS3 – v2(part)

For additional specifications, read chapter "Technical Specifications — CAN Bus Nodes" on page 56.

Read also the "Installation Guide I/O Monitor CAN Node", document 351503.033.

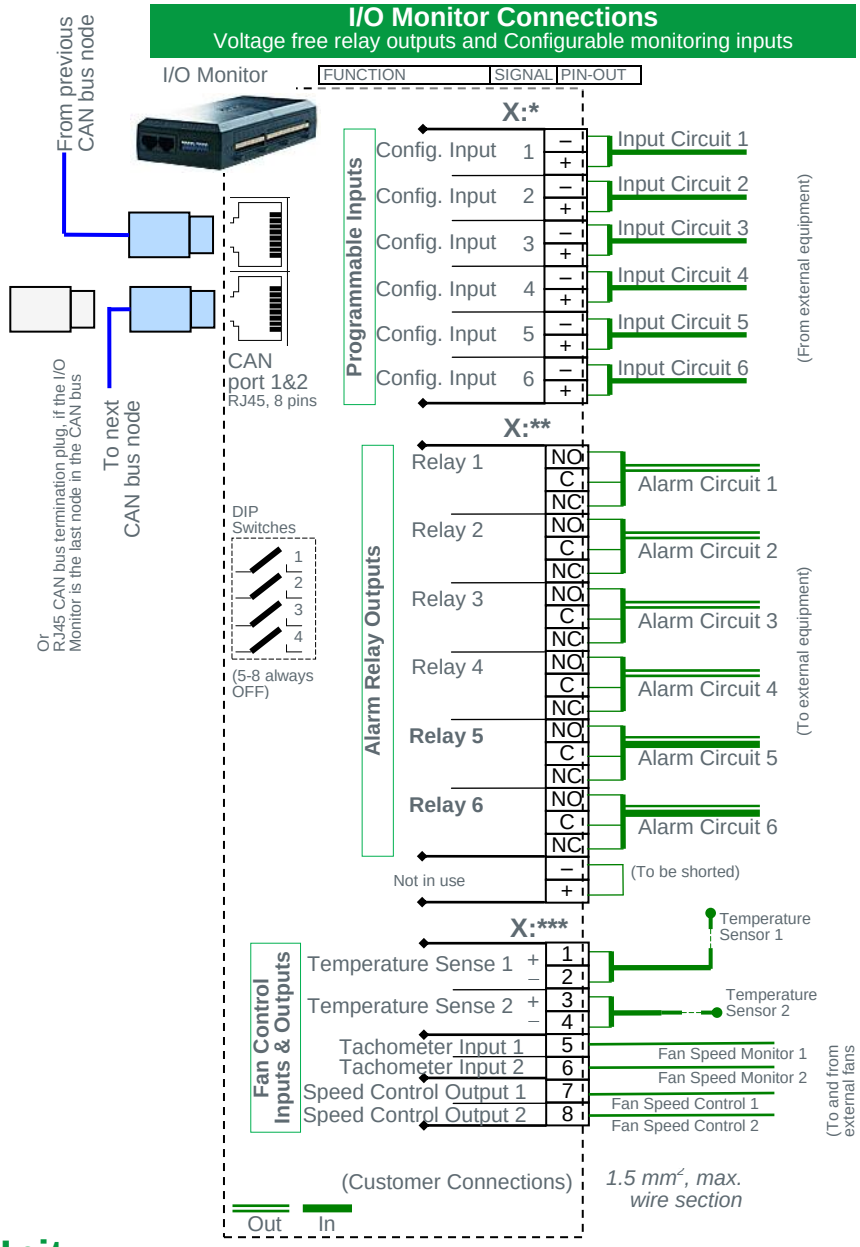


Figure 36 Connection Drawing I/O Monitor

CAN Power Unit

All CAN bus nodes are powered by the distributed power supplied on the CAN bus.

If the CAN bus needs to be isolated, or additional CAN bus power is needed, the CAN Power Unit can be connected to supplement the available power.

For additional specifications, read chapter "Technical Specifications — CAN Bus Nodes" on page 56.

CAN Power Unit	
Input	20-75Vdc Screw terminals
Outputs	+/-15V, 500mA Dual RJ45 connector
Functionality	○ Isolates the power distributed on the CAN bus ○ Increase the maximum number of CAN nodes in system
Note: 500mA is supplied per Smartpack	

Specifications are subject to change without notice
242100.CAN.DS3 – v2(part)

Technical Specifications — CAN Bus Nodes

Following Technical Specifications apply to all CAN Bus Nodes.

CAN Nodes			
Max. nodes	14 units of same type can be added a single CAN bus		
Mounting	Slotted groove for post mounting or DIN rail		
Visual Indication	3xLED (1xLED CAN Power) o GREEN: Power o YELLOW: Warning o RED: Alarm (Flashing LED: insufficient power)		
SW Upload tools	FWLoader v3.25 or newer and IXXAT USB-to-CAN Converter (p/n: 208565)		
Casing material	Plastic - V0 rated / Steel (CAN Power)		
Operating temp	-40 to 70°C (-40 to 158°F)	Storage temp	-40 to 85°C (-40 to 185°F)

Applicable Standards	
Electrical safety	IEC 60950-1 UL 60950-1 CSA C22.2
EMC	IEC 61000-6-1 IEC 61000-6-2 IEC 61000-6-3 /A1 IEC 61000-6-4 ETSI EN 300 386 v1.3.3 FCC Part 15B Subpart 109
Environment	2002/95/EC (RoHS) & 2002/96/EC (WEEE) ETS 300 019-2-1 Class 1.2 ETS 300 019-2-2 Class 2.3 ETS 300 019-2-3 Class 3.2

Specifications are subject to change without notice
242100.CAN.DS3 – v2(part)

7. Functionality Description

In this chapter you can find detailed description of the User menu options, and helpful information about expressions, technical terms and functions used in *Smartpack*-based DC power systems.

For description of the Service menu options, refer to the *PowerSuite* online Help system.

Alarm Reset (AlarmReset)

You can reset all active alarms by selecting "***UserOption>AlarmReset***", via the *Smartpack* controller's front keys. The controller will immediately report alarm conditions that are still active.

The *Smartpack*-based DC power system can be configured with *automatic* or *manual* alarm reset.

When *Automatic Alarm Reset* is enabled (default) — and the alarm condition no longer exists — the *Smartpack* controller will deactivate the alarm lamps and relays to indicate that normal operation is established.

When *Manual Alarm Reset* is enabled — and the alarm condition no longer exists — the operator must reset the alarm manually.

Display System Voltages (VoltageInfo)

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):

Option		***Description***
VoltageInfo →	***NomVolt***	Nominal output voltage
	BoostVolt	Battery boost-charging voltage
	LoBattMaj	Voltage limit for *Low Battery Major Alarm*
	LoBattMin	Voltage limit for *Low Battery Minor Alarm*
	HiBattMaj	Voltage limit for *High Battery Major Alarm*
	HiBattMin	Voltage limit for *High Battery Minor Alarm*
	LVBD	Voltage limit for *Low Voltage Battery Disconnect*
	LVLD 1.1	Voltage limit for *Low Voltage Load Disconnect*

Display Alarm Messages, (Log) (DisplayMessages)

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 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.

Display Controller's Firmware Version (SoftwareInfo)

You can display the *Smartpack* controller's firmware[13] and version numbers by selecting ***"UserOption>SoftwareInfo"***, via the *Smartpack* controller's front keys.

The firmware and version numbers are displayed in the format <nnnnnn.yys vv.vv>.

The "nnnnnn.yys" represents the firmware number. The "s" is a code for the firmware language: 1= Norwegian, 2= Swedish, 3= English, 4= German, 5= French, 6= Spanish, etc.

The "vv.vv" represents the firmware's version number.

Display Controllers' Serial Numbers (SerialNumber)

You can display the *Smartpack* controllers' serial numbers by selecting ***"UserOption>SerialNumber"***, via the *Smartpack* controller's front keys.

The serial numbers are displayed in the format <cc: nnnnnnnnnnnn>.

The "cc:" represents the ID or CAN bus address of the *Smartpack* controller with serial number "nnnnnnnnnnnn". Press the ↑ or ↓ keys to display the serial numbers of other controllers in the CAN network.

Display Module Information (Module Info)

You can display information about the modules and rectifiers communicating in the *Smartpack*-based DC power system, by selecting ***"UserOption>Module Info"***, via the *Smartpack* controller's front keys.

Following information may be displayed selecting the *Module Info* sub options (level 3):

Option			Description
Module Info →	***Rectifier nn→***	***Module Current***	Number of rectifiers connected and rectifiers' current
		Module Serial#	Rectifiers' ID and serial number
		Module InputVolt	Rectifiers' input voltage
		Module Status	Rectifiers' status
		Module Temp	Rectifiers' temperature
		Module OutputVolt	Rectifiers' output voltage
		Module SW Ver	Rectifiers' firmware version
	SolarCharger nn	(above options)	Number of solar charger modules and similar data
	DCDC48 nn	(above options)	Number of 48V DCDC converters and similar data
	DCDC24 nn	(above options)	Number of 24V DCDC converters and similar data

While the controller is accessing information from a specific module, the green LED on the module's front panel flashes.

The *Smartpack* controller sends out status messages every 200ms to all the modules 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
- Etc.

[13] The main program (firmware) is stored in flash memory chips.

Plug-and-Play Rectifier

When a rectifier is **hot plugged in a power shelf for the first time**, the *Smartpack* 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 *Smartpack* controller "recognizes" 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 indicated power shelf position, one module at a time, starting with ID number 1**, 2, 3 and so on. The sequence is indifferent after ID# 6. Read chapter "Mains Phase Assignement versus Rectifier ID", page 59.

The rectifiers' power shelf positions 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.

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.

Mains Phase Assignement versus Rectifier ID

In systems with 3 phase AC feed, the *Smartpack* 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 *Flatpack2* 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 either **4AC** or **4AC-3kW Power Shelves**[14] or **2AC Power Shelves**[15]. 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 *Smartpack* controller must "know" which phase is connected to which rectifier ID number.

Flatpack2 DC power systems are shipped from factory with empty power shelves. The rectifier modules are shipped in separate packaging, and you have to install the modules 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 *Smartpack* controller always uses rectifier ID 01, 02 and 03 to monitor mains phase L1, L2 and L3 respectively. If these rectifiers malfunction, rectifier ID 04, 05 and 06 will automatically take over.

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. Then a phase 1 fault will be alarmed as a phase 2 fault.

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.

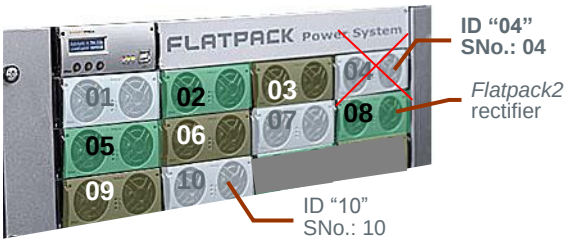
For instance: in a *Flatpack2* DC power system equipped with 10 rectifiers, rectifier with ID number "04" malfunctions. If you insert rectifier ID#10 in the position of the failing

[14] 4AC Power Shelves (Single AC feed: 4 AC inputs per shelf, each feeding 1 rectifier).
[15] 2AC Power Shelves (Dual AC feed: 2 AC inputs per shelf, each feeding 2 rectifiers).

ID#04, and then activate a rectifier reset, the *Smartpack* 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.

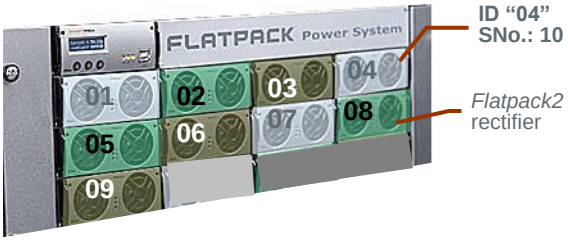
Example: Flatpack2 DC power system with malfunctioning rectifier;
3 power shelves with 10 rectifiers (rectifier ID #04 malfunctions)

Rectifier ID 01 Serial No. 01	Rectifier ID 02 Serial No. 02	Rectifier ID 03 Serial No. 03	Rectifier ID 04 Serial No. 04
Rectifier ID 05 Serial No. 05	Rectifier ID 06 Serial No. 06	Rectifier ID 07 Serial No. 07	Rectifier ID 08 Serial No. 08
Rectifier ID 09 Serial No. 09	Rectifier ID 10 Serial No. 10		



After rectifier reset*:*
3 power shelves with 9 rectifiers
(rectifier ID #10 reassigned to #04)

Rectifier ID 01 Serial No. 01	Rectifier ID 02 Serial No. 02	Rectifier ID 03 Serial No. 03	Rectifier ID 04 Serial No. 10
Rectifier ID 05 Serial No. 05	Rectifier ID 06 Serial No. 06	Rectifier ID 07 Serial No. 07	Rectifier ID 08 Serial No. 08
Rectifier ID 09 Serial No. 09			



Display System Mains Data (Mains Info)

You can display information about the power system's AC feed by selecting **"*UserOption>Mains Info*"**, via the *Smartpack* controller's front keys.

Following data may be displayed selecting the *Mains Info* sub options (level 3):

Option		*Description*
Mains Info→	***NoOfPhases nn***	Number of Mains phases in the system's AC feed
	Mains Status	The status of each of the phases
	Mains Voltage	The AC voltage of each of the phases

Display Battery Temperature Levels (TempLevel Info)

You can display how many hours the system's battery bank has been within a certain temperature range (level) by selecting **"*UserOption>TempLevel Info*"**, via the *Smartpack* controller's front keys.

The information is displayed in the format [nn: <ddC hhhhhH], which means:

- nn: The number of the temperature range or level (01 through 10)
- <ddC The range's upper temperature value, in degrees Celsius
- hhhhhH The number of hours the battery bank has been within the temperature range

Using the *PowerSuite* program, you can configure the upper and lower temperature limits for each of the 10 temperature ranges. *PowerSuite's* Battery Lifetime Temperature alarm monitor supervises all the temperature ranges, and calculates the total number of days the battery bank has been within the specified ranges. The monitor can be configured to automatically activate a Major and a Minor alarm when the number of days has exceeded a certain period of time.

The table shows an example of values entered in the Battery Lifetime Temperature monitor.

Temperature Range			*Time within Range*
Range #	Low Limit, °C	High Limit, °C	Hours
01	00	10	10
02	11	20	20
03	21	30	60
04	31	40	40
05	41	50	05
06	51	60	00
07	61	65	00
08	66	70	00
09	71	75	00
10	76	99	00

You can reset the values in the Battery Lifetime Temperature monitor either by selecting "*ServiceOption>BattLifeTime Rst*", via the *Smartpack* controller's front keys, or using *PowerSuite*.

Display Battery Information (BatteryInfo)

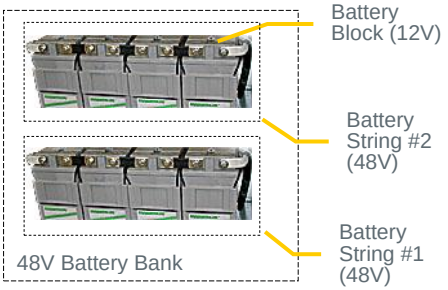
You can display information about the power system's battery bank by selecting **"*UserOption>Battery Info*"**, via the *Smartpack* controller's front keys.

Following data may be displayed selecting the *Battery Info* sub options (level 3):

Option		***Description***
BatteryInfo→	***NoOfString Nn***	Number of battery strings
	BattStringCurr	Each battery string's current
	BattStringTemp	Temperature of each battery string
	BattBlockVolt	Voltage of each battery block

For battery terminology, refer to chapter "About Battery Banks, Strings and Blocks", page 61 and to the "Quick Start Guide *Flatpack2* PS System", Art. 356804.103.

About Battery Banks, Strings and Blocks



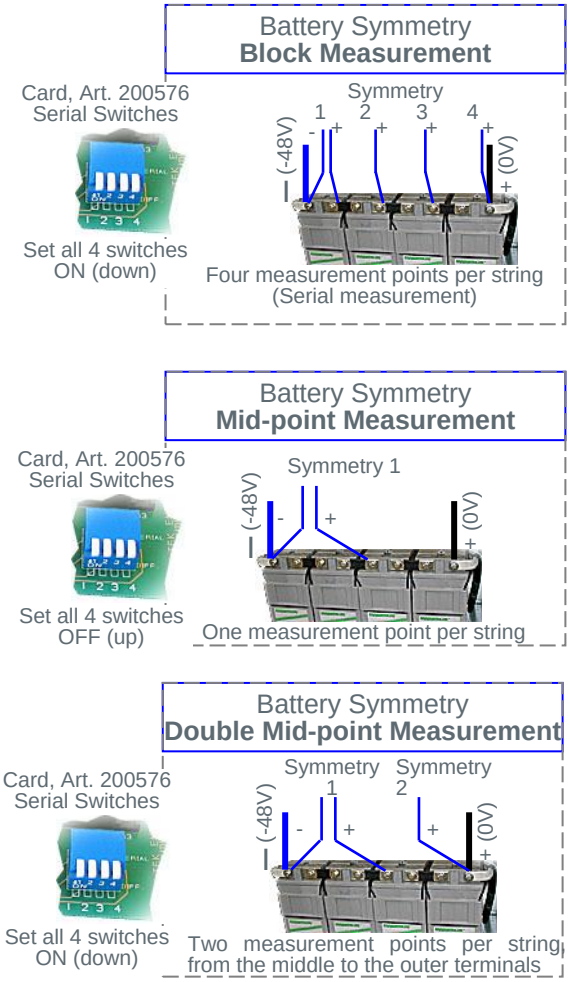
Normally, battery banks are implemented by connecting in parallel several battery strings; each string is formed by battery blocks connected in series.

Figure 37 Example of a 48V battery bank implemented with two 48V battery strings; each string consists of four 12V battery blocks

Battery Symmetry Measurements, 48V Systems — Controller

Symmetry measurement is a battery monitoring method for automatically detecting unbalanced battery blocks.

For information about 24V systems symmetry measurements, read the "Quick Start Guide *Flatpack2* PS System" Art. 356804.103.



Symmetry monitoring of a 48V 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

The *mid-point measurement method* requires 2 symmetry wires per battery string; the double *mid-point measurement method* requires 3 symmetry wires per battery string, while the *block measurement method* requires 5 symmetry wires per battery string. Refer to the system's quick start guide for connections.

Cabinetized DC power systems are normally delivered with the symmetry measurement method and the number of measurement points already preprogrammed in the *Smartpack* controller. Any deviation from factory settings requires Symmetry reconfiguration via the *PowerSuite* PC program.

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)

Figure 38 Example of terminal connection points for Symmetry Block, Mid-point and Double Mid-point measurement methods in 48V systems

Battery Symmetry Measurements, — Battery Monitor

In addition to using the Smartpack controller's inputs, you can connect Battery Monitor CAN Bus Nodes to perform symmetry monitoring of 48V battery strings.

For more information, read chapter "Battery Monitor" on page 52, and the "Installation Guide Battery Monitor CAN Node" document 351507.033.

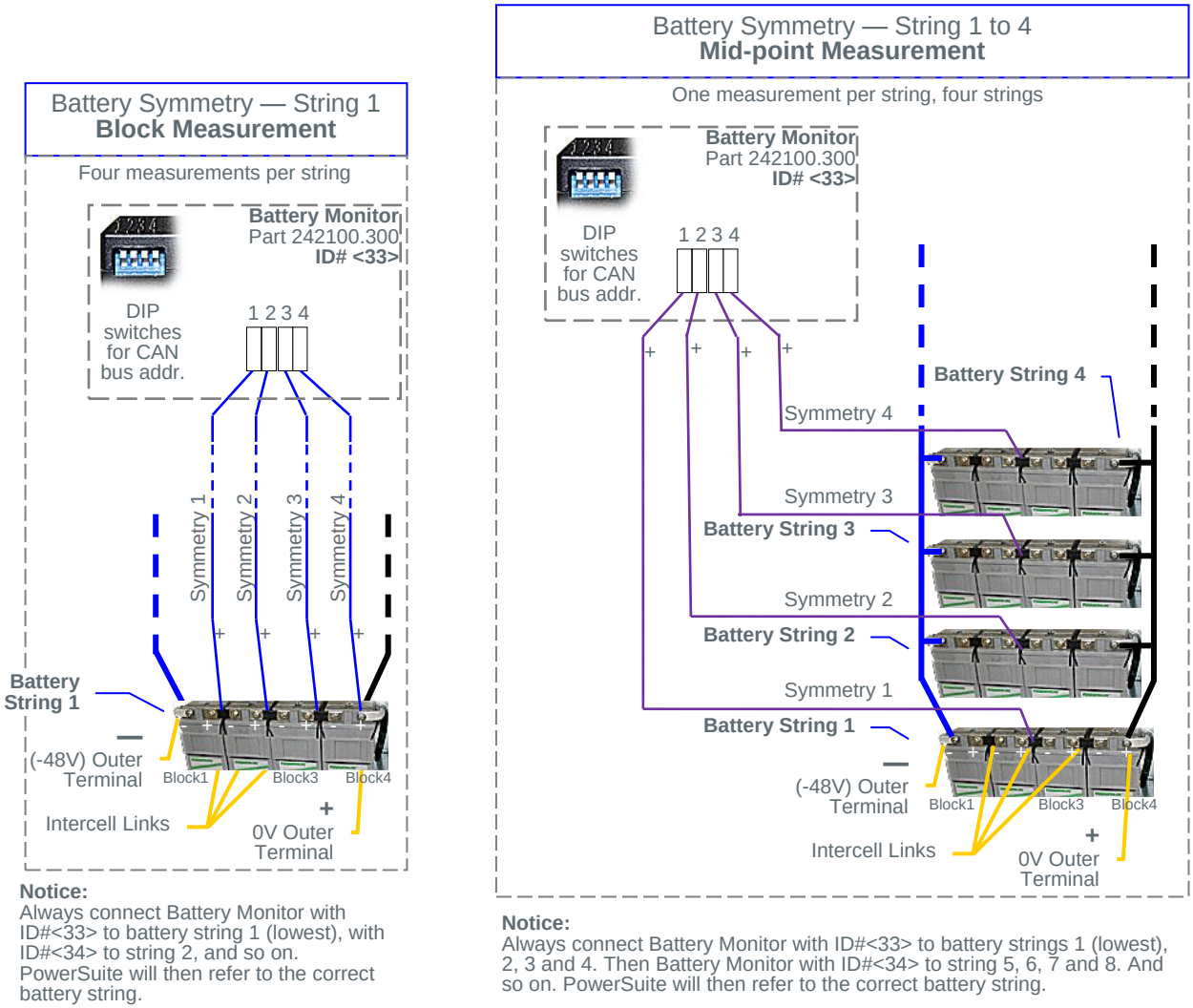


Figure 39 Example of battery symmetry connections in 48v DC power systems

Display Energy Usage, (Log) (Energy log)

You can display information about the power system's energy usage, (Wh) by selecting ***"UserOption>Energy log"***, via the *Smartpack* controller's front keys.

Following data may be displayed selecting the *Energy log* sub options (level 3):

Option			Description
Energy log→	***Battery***	*Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓*	Batteries' average energy per hour, day, week and total
	Load	*Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓*	Load's average energy per hour, etc (as above)
	Rectifier	*Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓*	Rectifiers' average energy per hour, etc (as above)
	Generator	*Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓*	AC Generator's average energy per hour, etc (as above)
	SolarCharger	*Hour ↑↓ Day ↑↓ Week ↑↓ Used ↑↓*	Sola Chargers' average energy per hour, etc (as above)

The *Energy Log* functionality represents an efficient way of logging the power system's energy usage, (Wh).

The *Smartpack* 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 by a connected AC generator or a solar charger.

For each of them, the controller stores the average energy provided during the last hour, the energy used the last day and the last week and the total energy provided (used) since system start.

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

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.

While the total energy provided (used) since system start is continuously updated, the controller calculates the values for the average energy delivered or supplied every hour, every day and every week. For example, the "Day kWh" value for the latest calculation represents the average energy consumption for the latest 24 hours (calculations).

Display Load Monitor Information, (Log) (LoadMonitor Info)

You can display individual information for each connected Load Monitor CAN Node unit by selecting ***"UserOption>LoadMonitor Info"***, via the *Smartpack* controller's front keys.

Following data may be displayed selecting the *LoadMonitor Info* sub options (level 3):

Option			Description
LoadMonitor Info→	***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, *output power and total energy*
	Unit nn.x ↑↓ ***Input nn.1*** ↑↓	*V – A – W – Total kWh*	delivered trough the load fuse

The *Load Monitor Info* functionality 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.

8. Glossary

Term	Description 1v0_2009-03-31
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 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.
CAN Bus	Controller Area Network (CAN or CAN bus) is a serial protocol utilized for communication between *Eltek Valere*'s rectifiers, controllers and other control units. The protocol is used in DC power systems that use the *Smartpack* controller, the *Compack* controller and in Aeon systems. 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.
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.
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.
Eltek Valere Network Utility Program	Simple Windows-based utility program (EVIPSetup.exe) that needs no software installation. It is used to display the *Smartpack* and *Compack* 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.
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.
EVIPSetup.exe	See Eltek Valere Network Utility Program
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 ts datagram delivery service.
GUI	Pronounced GOO-ee. Acronym for graphical user interface. A program interface that takes advantage of the computer's graphics capabilities to make the program easier to use. 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.
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.
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.
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.
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.
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.
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
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

Term	Description 1v0_2009-03-31
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.
pComm	RS232 serial protocol used by *Eltek Valere*'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.
PowerSuite	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.
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.
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.
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.
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.
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 Valere*'s controllers -- *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 Valere* DC power systems to be interoperable with SNMP enterprise management solutions, which are commonly in use within the Telecommunications industry.

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