ELTEK
A Delta Group Company

User Guide

Smartpack S Controllers

Monitoring and Control Units

Smartpack S-based Power Supply Systems

350030.013

356800.183, 3v6

SAFETY and ENVIRONMENTAL PRECAUTIONS

The **product warranty** becomes invalid if the following safety precautions are not followed during handling, installation, commissioning and general use/operation of *Eltek* power supply systems.

General Precautions


Device Hazard

G1 **CAUTION:** Even though the product incorporates protection circuitry and other safeguards, it can be **damaged, perform poorly or have a reduced lifetime** if it is exposed to **incorrect treatment** during transport, installation or service. Always handle the equipment using proper lifting techniques, do not roll, climb or drill hole in the cabinets or enclosures.


Electric Shock

G2 **WARNING: Opening the equipment may cause personal injury — even if the mains AC supply is disconnected. Hazardous voltages may be present inside, as large capacitors may still be charged.**

Environmental Precautions


Ventilated Hot Surface

E1 **CAUTION:** To avoid damage the equipment, **keep objects clear of system ventilation inlets, outlets and system fans**, if any, ensuring the **airflow** through the units is **not obstructed**, and that the fans rotate freely. Use caution with power modules, as they can reach **extreme temperatures** under load and normal operation.


Current Surge Protection

E2 **WARNING: The installer/user is responsible for ensuring that the power system is not damaged by current surges, over-voltages, etc. caused by external transients, lightning, electrostatic discharge, etc. To avoid damage and obtain the expected system reliability, it is mandatory to always install SPDs in Eltek's power supply systems. Follow the instructions given in "Requirements for Surge Protection", doc. 2024623**.


Humidity & Dust Protection

E3 **WARNING: The electronics in the power supply system are designed for indoor, clean environment. When installed in outdoor enclosures — using heat sinks or closed loop heat management systems — it is important to maintain the equipment closed and tight during operation, to avoid external air entering the enclosure. Also, when using open loop heat management systems, it is important to replace the filters on a regular basis. Indoor installations in dusty or humid areas require appropriate air filtering of the room, or filtering of the air entering the power system. Follow the instructions given in "Generic Guidelines Environmental Protection.", doc. 2038879**

Precautions during Installation


Qualified Personnel

I1 **CAUTION: Read the user documentation carefully** before installing and using the equipment, as installation and operation is to be performed as described in it. Always tighten screws and bolts with the **torque values recommended** in the documentation. For safety reasons, the **commissioning and configuration of the equipment is only to be performed** by *Eltek*'s personnel or by authorized and qualified persons.


EMC, NEC/CEC Regard

I2 **CAUTION:** This product is tested and verified according to international safety, environmental and EMC standards. Any **non-*Eltek* equipment** installed into this product after delivery might influence the performance and **could infringe the original approvals**. The **installer is responsible** for ensuring that the environmental properties of this product/ system do not deteriorate during installation, and that it is performed in accordance with applying regulations.

Installations in USA and Canada must comply with NEC/CEC requirements.


Device Hazard

I3 **CAUTION:** Before you start the electrical installation, you must **always disconnect** all external supply fuses, as well as internal battery and load fuses/ breakers, if any.


Electric Shock

I4 **WARNING: For safety reasons (high leakage current / high touch current) you must always connect the AC earth wire (PE) to the terminals, before you connect the AC input cable(s).**

The batteries, if any, represent a major energy hazard. To avoid short-circuit of battery poles, you must always remove metallic objects — uninsulated tools, rings, watches, etc. — from the vicinity of the batteries.


Electric Shock

I5 **WARNING: 60V power systems, and higher voltage systems, are only to be installed in Restricted Access Locations (RAL). Access must be limited by use of tool, i.e. lock and key.**

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QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001
Certificate No.
4072-2007-AQ-NOR-NA

ENVIRONMENTAL SYSTEM CERTIFICATION
DNV·GL
ISO 14001
Certificate No.
11276-2007-AE-NOR-NA

Eltek's Part Number:

242100.410	*Smartpack S Controller,* power rack mounted
242100.415	*Smartpack S Controller,* panel mounted

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1. Introduction

The advanced *Smartpack S* controllers are developed for *Eltek*'s *Flatpack S* and *Flatpack2* system platform, suitable for small and medium telecom and industrial power systems.

About this Guide

This booklet provides users of *Smartpack S*-based power systems with the required information for operating the system using the *Smartpack S* front panel. The booklet also describes the *Smartpack S* controllers' building blocks, external connections and technical specifications.

Read also the generic and site specific documentation for your power system.

For detailed functionality description, browse and search through the *Functionality Description topics in the* Online Help system.

System Diagram — Flatpack S Power System

The generic *Smartpack S* (SP-S) control system — used in *Flatpack S* and *Flatpack2* PS systems — monitors and controls the whole system.

The *Smartpack S* controller serves as the local user interface between you and the system, monitors and controls the power system's internal wiring and supplies the CAN bus with power. Also, the controller provides the system with input monitoring and output controlling signals. System configuration is possible using a standard web browser or via the controller's front keys.

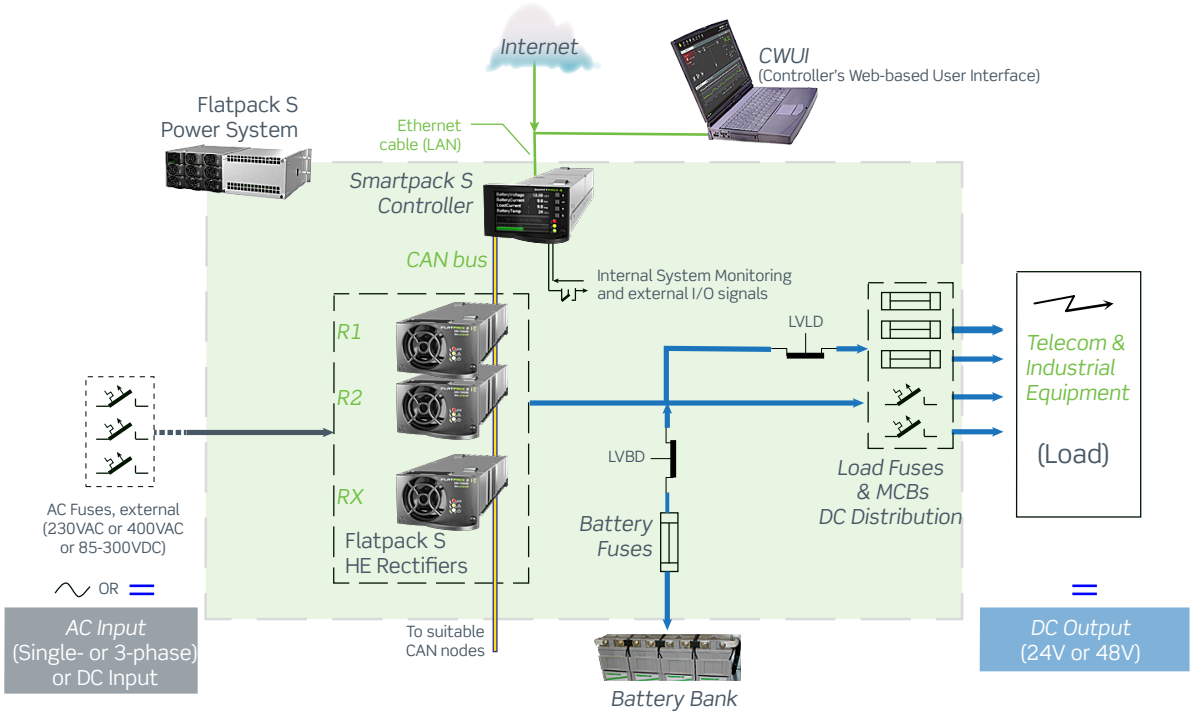

Figure 1. Typical Flatpack S DC power supply system for telecom and industrial equipment, fed from external AC mains supply. It consists of rectifiers in power shelves, Smartpack S controller, DC distribution, etc.

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2. The Smartpack S Controller

The Smartpack S controllers are compact, rich-featured, hot swappable, all-in-one powerful controllers, used as master controllers in power supply systems. They serve as the local user interface between you and the power system.

The *Smartpack S* controllers cover all control and monitoring needs of small to medium telecom and industrial power systems. System status and configuration is fully available locally via the display or via the Ethernet port, both remote or locally. Designed for the *Flatpack S* and *Flatpack2* system platforms, the *Smartpack S* controller finds its way into many space restricted application. Used in the **1U high, 265 mm deep power racks**, the *Smartpack S* controller offers comprehensive monitoring and control of a 2- 3 kW system occupying less than 6 litres. The *Smartpack S* controller is **also available for panel mounting**, see *Figure 8 on page 20.*

Key Features

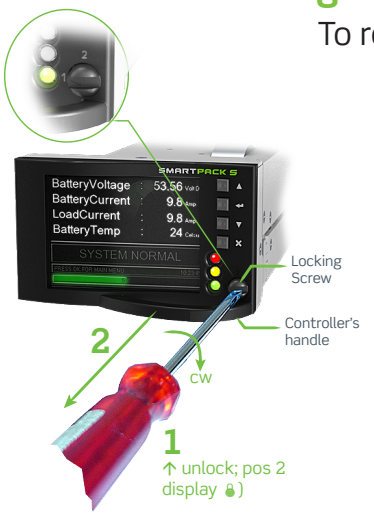
A wide range of features are implemented in the *Smartpack S* controllers, as mentioned below:

- ◊ Graphical 2.2” TFT high contrast, high resolution color display for easy navigation
- ◊ Ethernet for remote or local monitoring and control via Web browser
- ◊ LEDs for local visual alarming (Major, Minor, Power ON)
- ◊ SNMP v.3.0 protocol with TRAP, SET and GET on Ethernet. Email of TRAP alarms
- ◊ 6 programmable relay outputs
- ◊ 6 programmable multi-purpose inputs (“digital inputs” or analog signals)
- ◊ Comprehensive logging
- ◊ Automatic battery monitoring and test
- ◊ Battery quality indication (based on test results)
- ◊ User defined alarm grouping (Boolean logic for grouped alarms)
- ◊ Uploading and downloading of firmware and configuration files via PC
- ◊ Buzzer for audio indication of alarm conditions and key pressure feedback

Read also section *"Technical Specifications" on page 17*, for more details.

Installing Smartpack S Controllers

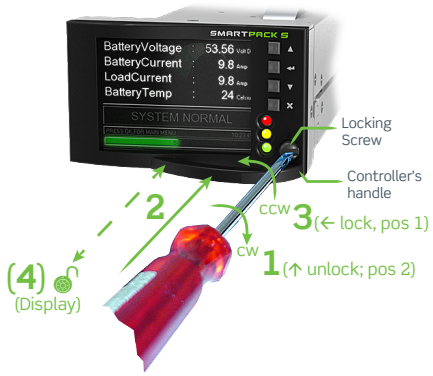
Removing Smartpack S Controllers



To remove the *Smartpack S* controllers[1] , do following:

1. **Unlock the controller** by
   using a screwdriver to turn the locking screw ¼ of a turn clockwise to the unlocked position 2
   Notice: the display unit is locked, and cannot be pulled out
2. **Remove the controller** by
   using the controller's handle to pull the module loose. Support from underneath before the unit is completely free
3. **Mount blind panels** in unused controller or power module locations

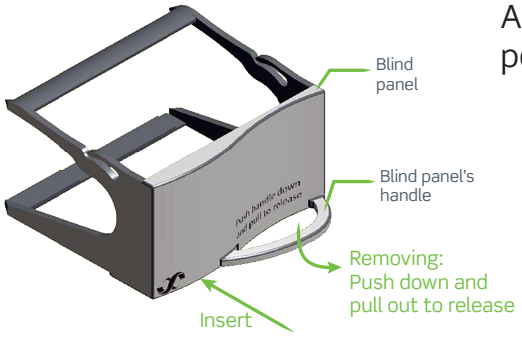
Mounting Smartpack S Controllers



To mount the *Smartpack S* controllers, do following:

1. **Unlock the controller** by
   using a screwdriver to turn the locking screw ¼ of a turn clockwise to the unlocked position 2
   Notice: the controllers may be inserted in the power shelf with the locking screw in both locked and unlocked positions
2. **Insert the controller** by
   sliding it fully into the power shelf, so that it makes proper contact. Support from underneath
3. **Lock the controller** by
   using a screwdriver to turn the locking screw ¼ of a turn counterclockwise to the locked position 1. Then, the controller will be securely locked in the shelf, or ready for transport
   Notice: the display unit is unlocked, and can be pulled out slightly to access the Ethernet port

Mounting or Removing Blind Panels



Always mount blind panels in unused controller or power module's locations. Do following:

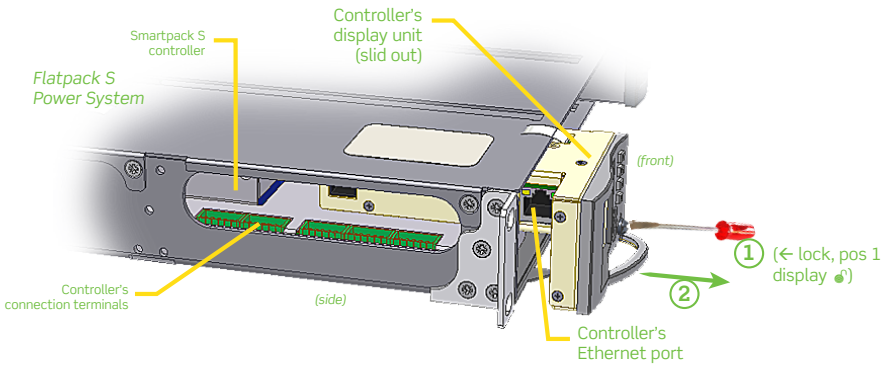
- **To mount a blind panel**
  insert the panel in an unused location until the panel engages and locks into position
- **To remove a blind panel**
  push the panel's handle downwards and pull out to release the panel

1 This section applies to the power rack mounted Smartpack S controllers

Accessing the Controller's Ethernet Port

To access the *Smartpack S* controller directly from a stand-alone computer — or via a Local Area Network (LAN), if available —you have to connect an Ethernet cable from the computer to the controller's Ethernet port. Refer to section *"Location of Connector, Communication Ports" on page 9.*

Do the following to **access the Ethernet port from the front**:

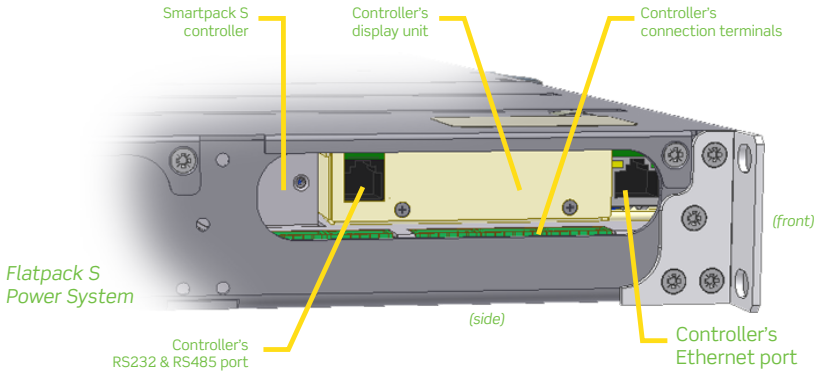


1. Lock the controller (locking screw in locked position 1)
2. Slide the *Smartpack S* controller's display unit slightly out
3. Connect the cable to the controller's Ethernet port

The controller's Ethernet port can be accessed from the power system's front, for temporarily connections to a computer or LAN, e.g. to configure the system or upgrade the firmware.

Locking Screw Position	Smartpack S Controller	Display Unit
1	Locked	Unlocked
2	Unlocked	Locked

Do the following to **access the Ethernet port from the rear**:



1. Remove the *Smartpack S* controller, while locking screw is unlocked position 2
2. Connect the cable to the controller's Ethernet port, and fasten the cable
3. Insert the controller and lock it (locking screw in position 1)

The Ethernet port can also be accessed from the power system's rear, for more permanent connections of the system to a LAN. A dedicated Ethernet cable may be ordered from *Eltek*, when the rear cable entry to the controller becomes too tight.

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Location of Connector, Communication Ports

This section describes the location of terminal blocks, connectors and ports in the *Smartpack S* controller. For a complete list of signals, pin-out, etc, refer to section *"Connection Drawing" on page 10.*

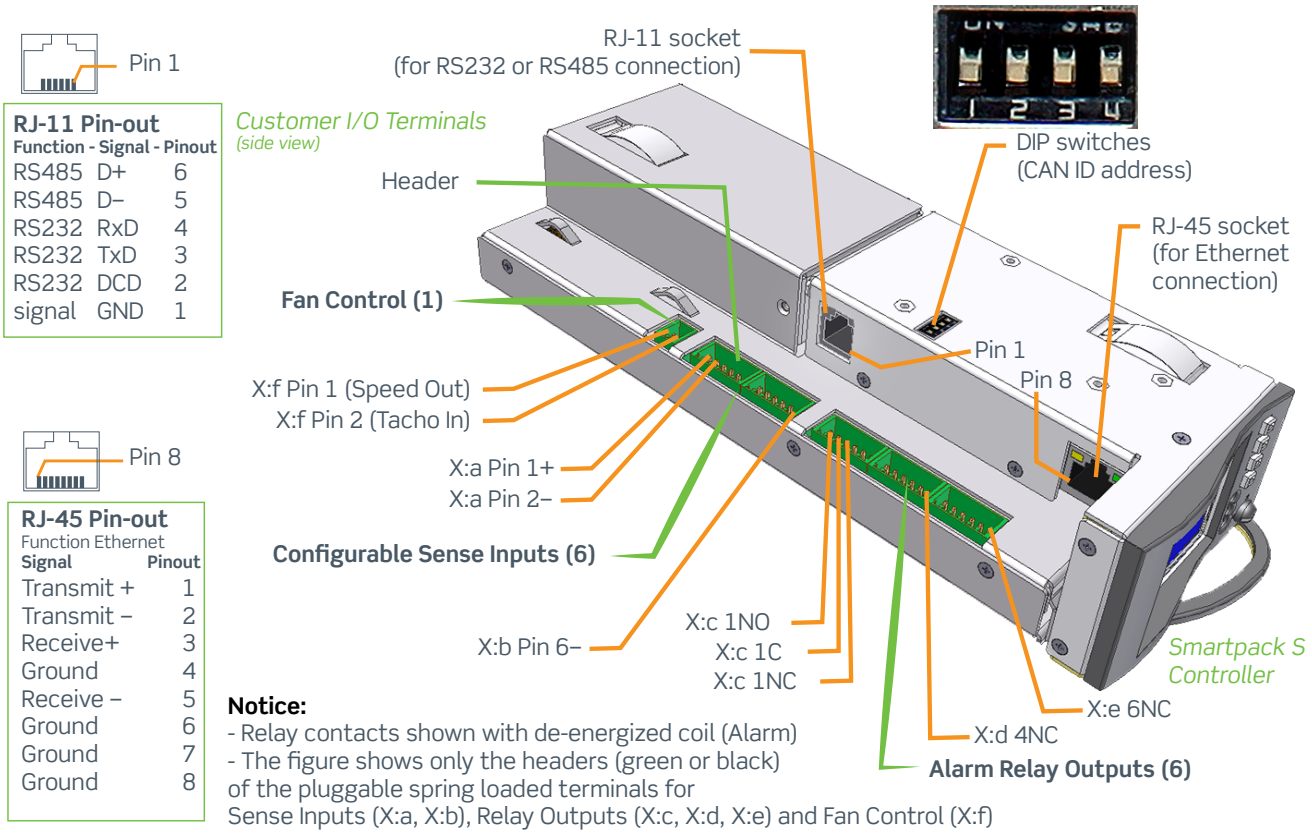

Figure 2. Location of pluggable terminal blocks (black or green), RS232/RS485 port and Ethernet connector in the Smartpack S controller

All the controller's system connections to the system's backplane are implemented via an edge connector, when inserting the controller in the power system.

In *Smartpack S* panel mounted controllers, these internal connections are available on terminal blocks, read section *"SP S Ctrl PM – Location of Terminals, Ports, LEDs" on page 20*.

Isolation Sense Jumper - Earth Detection

In *Smartpack S* controllers, part 242100.410, the **Isolation Sense jumper** — used to "connect" or isolate the internal Earth Fault Detection measuring circuitry — is **located externally** in the system's power rack back plane.

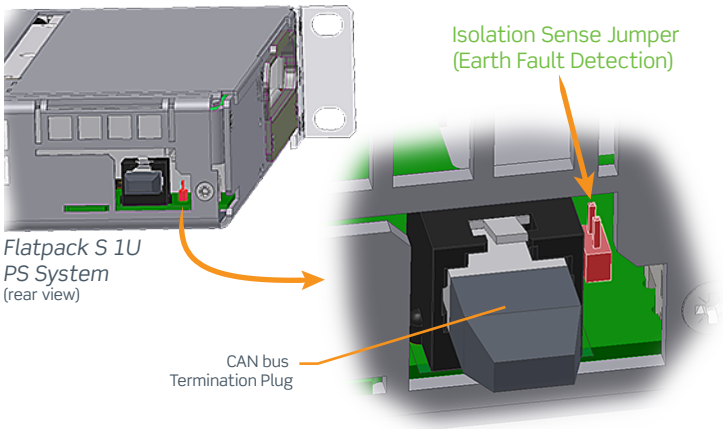

Figure 3. Isolation Sense Jumper in the back plane of a Flatpack S 1U PS system

Connection Drawing

Use this drawing as a customer connection reference for all cabling. You find the exact location of connection terminals, plugs, DIP switches, jumpers, etc. by referring to section *"Location of Connector, Communication Ports" on page 9.*

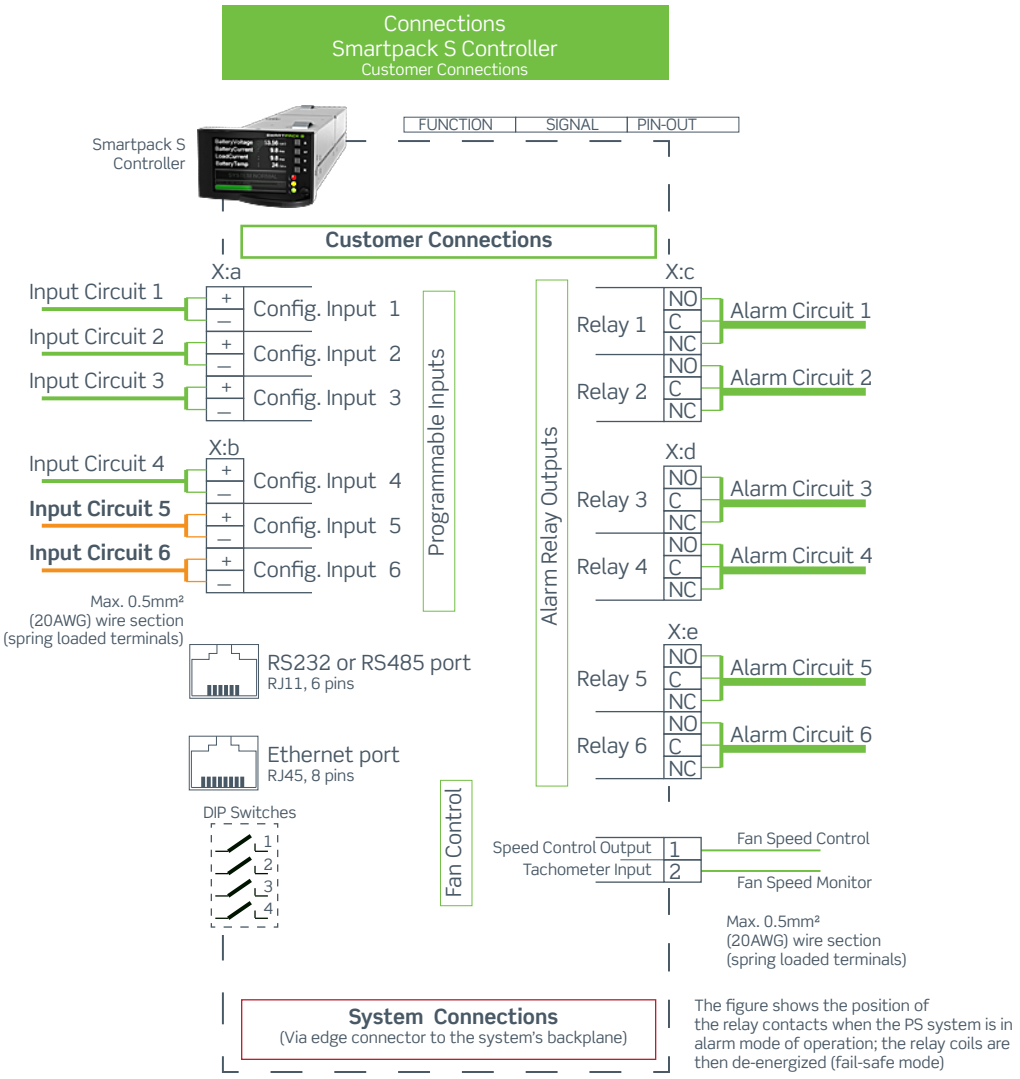

Figure 4. Connection Drawing for Smartpack S controller

When using the RS232 / RS485 port, you must configure RS232 to COM1 and RS485 to COM2, e.g. via *PowerSuite*.

Configurable Input Signals

The configurable **inputs 1 through 4** operate in the range of max. – 10 to +10VDC, and are intended for great accurate measurements, e.g. for temperature sensing using an external temperature NTC probe. Also, these inputs are suitable for monitoring other sensors (of pressure, humidity, etc.) that output 4mA to 20mA. An external 470 ohms resistor is then to be connected to the input's terminals on the controller, in parallel with the sensor's cables.

The configurable **inputs 5 and 6** operate in the range of 0 to 75VDC, and are in-

tended for e.g. system voltage and battery symmetry measurements.

All the 6 inputs may be configured as Auxiliary Switch (open/close, pull-up or pull-down), as temperature sense inputs with external NTC sensors, or as Clock inputs.

Read also section *"Technical Specifications" on page 17*

Climate Control Signals

The *Smartpack S* controllers are equipped with input and output signals to **monitor and control the fan speed and compartment temperature** inside e.g. fan-cooled outdoor cabinets.

The six configurable inputs are suitable to be used with external NTC temperature sensors, e.g. to monitor the temperature inside fan-cooled outdoor cabinets.

The **"Tachometer Input"** is developed to monitor the rotational speed of a fan. The fan speed is displayed as a percentage of the maximum speed. In order to convert the signal frequency on the tachometer input to the correct percentage speed, the input must be configured with the number of pulses per revolution (ppr) and with the maximum fan speed (rpm).

The **"Speed Control Output"** is designed to control the speed of a fan. The output can be configured to give a linear control signal from 0V (0% fan speed) to 10V (100% fan speed) or e.g. 5V (100% fan speed) if suitable for the application.

Warning: To prevent damaging the Speed Control Output, do not connect clamping diodes directly on the fan's control input. Also, the input impedance of the fan's control input must be 10KΩ or greater.

Earth Fault Detection Circuitry

The **Isolation Sense jumper**[2], see *Figure 3 on page 9*, is used to "connect" or isolate the internal Earth Fault Detection measuring circuitry.

Inserting the jumper **makes the internal circuitry active**. Removing the jumper (e.g. with needle-nose pliers) isolates or disconnects the circuitry from the ground (read topic *Earth Fault Detection* in Online Help), which is required e.g. during isolation tests at the factory or in Telecom systems with grounded DC output or when using external earth fault detection equipment.

When the internal Earth Fault Detection measuring circuitry is active, you can enable and configure the Earth Fault Alarm Monitor to monitor the circuitry and be able to **generate earth fault alarms**. You can do this e.g. using PowerSuite (read topic *Control Unit Earth Fault tab* in Online Help) or the master controller's keypad or via its web-based user interface (CWUI).

2 Some controllers, e.g. the *Smartpack2 Basic Industrial*, are shipped from factory with the Isolation Sense jumper removed, as they incorporate an internal relay that automatically implements the jumper's function, when you enable and configure the Earth Fault Alarm Monitor to be able to generate earth fault alarms. By default the Earth Fault Alarm Monitor is disabled and the internal Earth Fault Detection measuring circuitry is isolated. When you enable the Earth Fault Alarm Monitor, the internal relay automatically "connects" the measuring circuitry.

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CAN Bus Termination

To ensure a correct bus communication and avoid data reflection, you must always **terminate the CAN bus with two 120Ω resistors**, one at each end of the line (60Ω bus impedance).

Smartpack S-based power systems are shipped from factory with the CAN bus already terminated with 120Ω resistors. The **CAN bus termination** is implemented with a special RJ45 plug with built-in 120Ω end-of-line resistor.

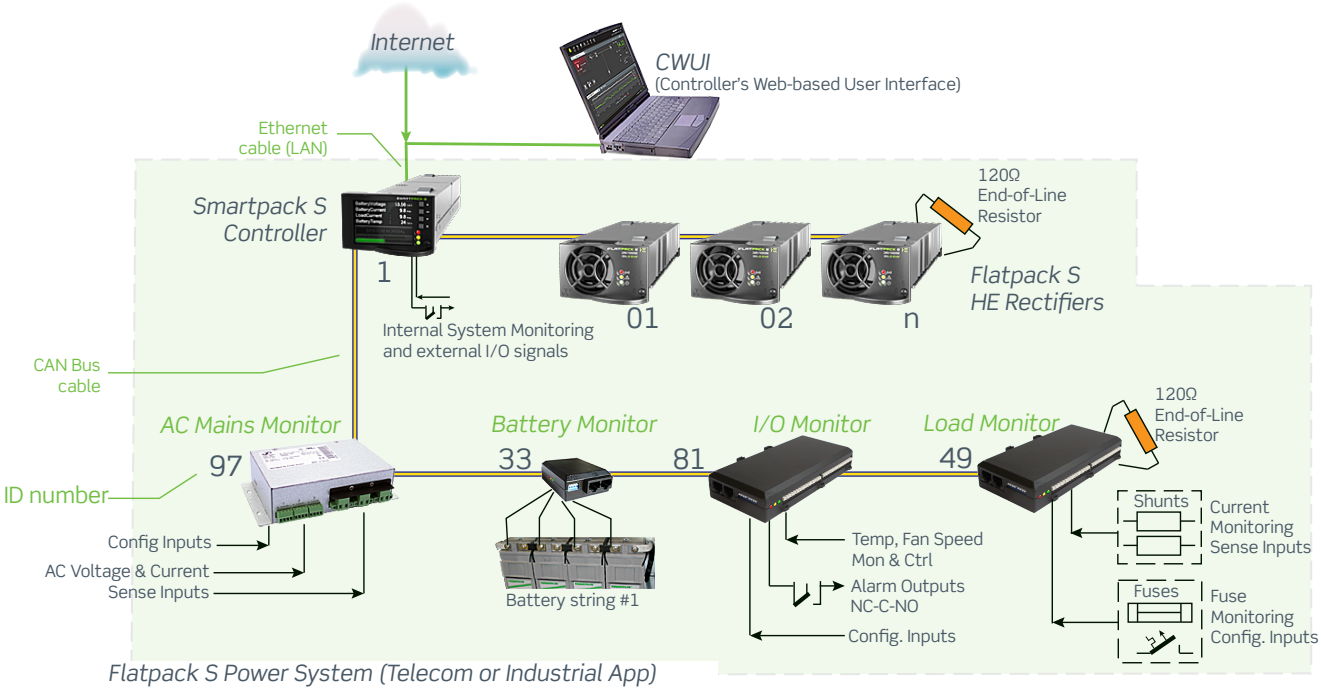

Figure 5. Example of CAN bus addressing and termination in a Flatpack S power system with Smartpack S-based control system and some CAN nodes connected the CAN bus

When connecting more CAN nodes to the bus, you have to remove the CAN bus termination plug from one of the CAN bus ends, and plug it in one of the CAN ports on the last connected CAN node.

CAN Bus Cabling

In addition to the two dedicated wires for communication, the CAN bus multi-wire cable must integrate wires for the CAN power supply and other signals. In standard industrial environments, the CAN bus can use standard cabling without shielding or twisted pair wiring. If very low interference (EMI) is required, a CAT-5 twisted-pair cable is recommended.

Configuration

By the default, *Smartpack S*-based power systems are shipped from factory with the controllers correctly installed and configured inside the power system.

CAN Bus Addressing

The power system's master controller dynamically software-assigns ID numbers to power modules. The master controller registers the power modules' ID numbers — or CAN bus address (01, 02...) — together with their Serial Numbers (**software assignment**).

Other control units make use of DIP switches for configuring their unique CAN bus ID number (**hardware assignment**).

The *Smartpack S* controller's ID numbers (1, 2...14) are assigned by DIP switches on the controller's top, refer to section *"Location of Connector, Communication Ports" on page 9.*

A maximum of 14 *Smartpack S* controllers may be connected to the CAN bus.

*Smartpack S Controller***	ID #	DIP Switch Position 1 — 2 — 3 — 4
1st Controller	1	OFF—OFF—OFF—OFF
2nd Controller	2	**ON** —OFF—OFF—OFF
3rd Controller	3	OFF— **ON**—OFF—OFF
4th Controller	4	**ON** — **ON**—OFF—OFF
5th Controller	5	OFF—OFF—**ON** —OFF
6th Controller	6	**ON** —OFF— **ON**—OFF
7th Controller	7	OFF—**ON**— **ON** —OFF
8th Controller	8	**ON** — **ON**— **ON**—OFF
9th Controller	9	OFF—OFF—OFF—**ON**
10th Controller	10	**ON** —OFF—OFF—**ON**
11th Controller	11	OFF—**ON** —OFF—**ON**
12th Controller	12	**ON** —**ON** —OFF—**ON**
13th Controller	13	OFF—OFF—**ON** —**ON**
14th Controller	14	**ON** —OFF— **ON** —**ON**

Smartpack S controller's DIP switch configuration
ID <1>
(All Switches OFF)

Note:
The controller's ID # corresponds to the DIP switch's binary value plus 1
** The DIP switch positions above applies to all controllers, except for *Smartpack2 Master* and Compack controllers, which have unchangeable ID# 11 and 1 respectively

Table 1. Smartpack S controller's DIP switch addressing

Notice that the CAN bus address of *Smartpack S* panel mounted controllers are by default ID <1>, refer to section *"SP S Ctrl PM - Connection Drawing" on page 21.*

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Front Panel Operation – Smartpack S Controller

This section describes the *Smartpack S* controller's[3] keys and indicators, and how to operate the *Smartpack S*-based DC power system from the controller's front panel.

Figure 6. Smartpack S controller's front keys and indicators

Graphical Display

The Graphical Color Display — 2.2" TFT — is either in Status Mode (displays the system's status) or in Menu Mode (displays the menu structure). The *Smartpack S* controller has the following LED indications:

LED Indicator	Illumination Status	Description
Power	OFF ON green	The controller has NO supply The supply is healthy
Warning	OFF ON amber	No Warning Warning (Minor alarm, Non-critical alarm)
Alarm	OFF ON red	No Alarm Alarm (Major alarm, Critical Alarm)

Table 2. Description of the Smartpack S controller's LED illumination status

Front Keys

You can operate the power system navigating intuitively through the graphical menu structure via the following 4 front keys. We recommend using a pen or similar tool to press the keys, as they are small.

- The **Enter** or **Left arrow** key
  When entering numbers, a **short press** of this key navigates to the left.
  A **long press** of this key to enter and save data
- The **Cancel** or **Right arrow** key
  When entering numbers, a **short press** of this key navigates to the right.
  A **long press** of this key to cancel or abort data
- The **Up** and **Down arrow** keys
  to navigate up- or downwards the menu icons, point at options and increase and decrease values

3 This section applies both to the standard and the panel mounted Smartpack S controllers

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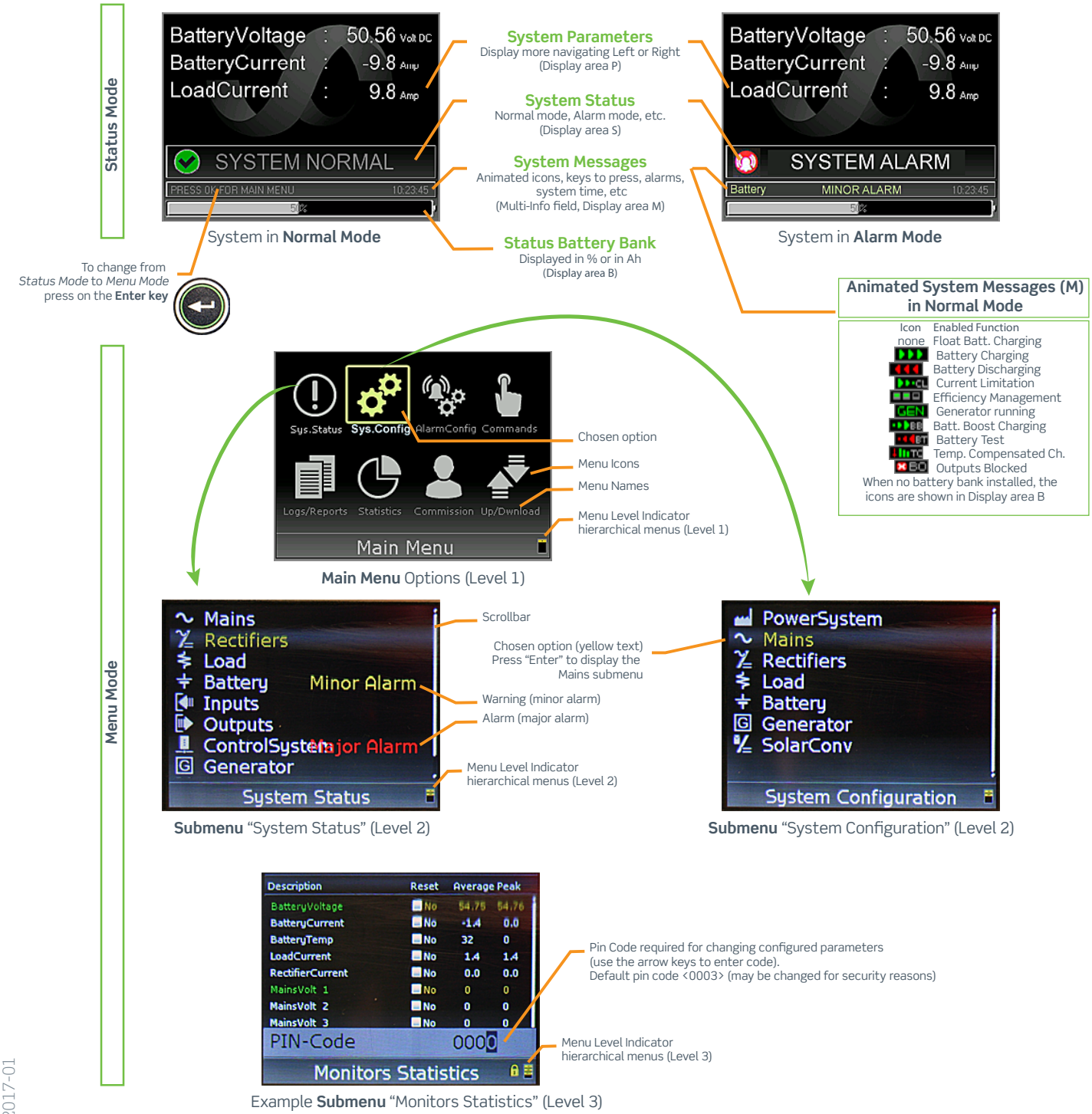
Software Menus

The *Smartpack S*-based system's functionality is accessed via a network of software menus and submenus[4], enabling you to configure and control the whole power system from the controller's front panel. When browsing the menus, the Menu Level Indicator shows the menu level you are in. Editing parameters is password protected, (default pin code <0003>, may be changed for security reasons). The display can be in **Status Mode** or in **Menu Mode**.



4 You can also read the description of the complete system functionality, using a PC's web browser to access the *Online Help*, or reading the PowerSuite program's Help.

Controller Access — Via Stand-alone PC

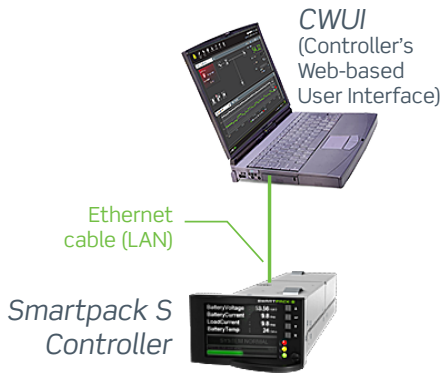
You can access the *Smartpack S* controller directly from a stand-alone computer, or via a Local Area Network (LAN) if available.

Each controller is shipped with a unique *Eltek* MAC address stored inside the controller and marked on the controller's label, and with the **fixed IP address ‹192.168.10.20›**.

Do following to access the controller:

1. **Start** the "Eltek Network Utility" **(ENU) program**

2. **Connect the computer to the controller**;
   using a cable between the controller's and the PC's Ethernet ports, read *page 8* or *page 20* (SP S panel mounted)
   check its MAC address is displayed



3. **Find the computer NIC's IP address**
   and subnet mask (network card)
   Tip: using DOS command IPCONFIG, in a Command Prompt window
   e.g. computer's IP address ‹169.254.52.132› Subnet mask ‹255.255.0.0›

4. **Change the controller's IP address**
   and Network Mask to be in the same range as the computer's
   Tip:
   Using the ENU program,
   1. Select the controller,
   2. Click in the "IP config..." button
   3. Change e.g.
      from default ‹192.168.10.20› ‹0.0.0.0›
      to IP address ‹169.254.52.133› ‹255.255.0.0›,
   4. Click on the "Submit" button

   Notice: Check that the IP address ‹169.254.52.133› is not used, e.g. issuing the DOS command: "Ping 169.254.52.133"

5. **Access the controller's** configuration pages
   in your Web browser, e.g. clicking the "Web Interface" button in the ENU program

6. **Log in** with the ‹admin› account

7. **Change** the controller's Device Name

After accessing the controller, you can configure and monitor the power system using a standard web browser (via *CWUI*) or via the *PowerSuite* program (newest version available on our *FTP server*) Contact your closest *Eltek* representative.

For detailed functionality description, browse and search through the *Functionality Description Online Help* .

Technical Specifications

Model	*Smartpack S Controllers*
Part number	242100.410 (power rack mounted), 242100.415 (panel mounted)
INPUT DATA	
Voltage (nominal)	10 - 75 VDC
System output grounding	Positive, Floating and Negative distributions. All inputs are referenced to shunt.
Power Consumption	3.1W max - no relays energized (display sleep) 5.5W max - all relays energized (display ON)
SYSTEM CONNECTIONS - SYSTEM MONITORS	
Voltage sense, system voltage support	12VDC, 24VDC, 48VDC & 60VDC
Current sense, shunt support	0 - 20mV and 0 - 60mV
Battery fuse monitoring	Auxiliary switch NO/NC, Pull up/down
Load fuse monitoring	Auxiliary switch NO/NC, Diode Matrix Pull up/down
Ground fault detection	Simple bridge circuit detection [Tolerance: ±10%, alarm range: 25kΩ – 500kΩ]
Fan speed monitoring	Tacho sense 0-65000 rpm [Input max. 15V]
SYSTEM CONNECTIONS - LVD CONTROL	
Battery disconnect	1 (latched or non-latched supported)
Load disconnect	1 (latched or non-latched supported)
INPUTS AND OUTPUTS	
Digital configurations, Inputs #1-6	Auxiliary switch: NO/NC
Analog configurations, Inputs #1-4	Analog Voltage[±0 - 10V] ±4-20mA current measurement (through external 470kΩ resistor) Temperature (for NTC probe)
Analog configurations, Inputs #5-6	Analog Voltage[0-75V]; Symmetry measurement
Output configurations, Outputs #1-6 (alarms)	6x Relay–Dry/Form C; Configurable Normally Open/Closed [Max capacity 75V/2A/60W]
Fan Control	Analog Voltage [0 - 10V]; Output Current 0 - 20 mA Fan Input Impedance minimum 10 kΩ
CAN Power available for Eltek CAN Nodes	500mA
USER INTERFACE	
Local	2.2” TFT 65k Colour display; QVGA resolution; 4 keys
Ethernet port	10/100 BASE-T (HP Auto MDI/MDI-X) IP protocols: HTTP / SSL, SNMP v3, MODBUS TCP and pComm UDP (*PowerSuite*)
Serial port	RS-232 and RS-485 on RJ11 connector Serial protocols: MODBUS RTU, Modem Call-Back/SMS reporting (PSTN or GSM), COMLI, CSCP and pComm (PowerSuite)
GENERAL SPECIFICATIONS	
Dimensions part 242100.410 (WxHxD) Dimensions part 242100.415 (WxHxD)	72.2 x 43.0 x 220.7mm (2.8 x 1.7 x 8.7”) 232.2 x 76.2 x 33.0mm* (9.1 x 3 x 1.3”) (* depth behind panel)
Temperature Range	Operating -40 to +65˚C (-40 to 149˚F)
DESIGN STANDARDS	
Electrical safety	UL 60950-1-3rd edition, EN 60950-1-3rd edition
EMC	ETSI EN 300 386 V.1.4.1 EN 61000-6-1 / -2 / -3 / -4 FCC Part 15 Subpart 109
Marine*) part 242100.410	DNV- OS-D202, Ch.2 Sev.4 (DNV 2.4), Temperature Cl. B, Humidity Cl. B, Vibration Cl. A and EMC Class B
Environment	ETSI EN 300 019: 2-1 (Class 1.2), 2-2 (Class 2.3) & 2-3 (Class 3.2) ROHS compliant

*) As part of CA0603.000 Flatpack S 3U Marine system
Specifications are subject to change without notice

Doc 242100.410.DS3 – v4' and 242100.415.DS3 – v3'

Firmware Upgrade Controller

Upgrade of the *Smartpack S* controller's firmware, while the system is live, is performed via the controller's Ethernet port, using the "*Eltek* Network Utility" program (ENU) to transfer the firmware file to the controller.

Upgrading the firmware does not delete or change any of the configuration and calibration values stored in the controllers.

You can upgrade the firmware of the *Smartpack S* controller using the following method.

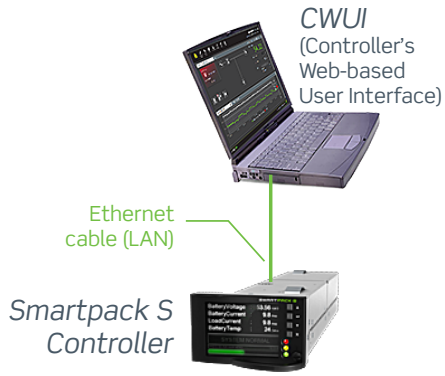


Figure 7. Example of Smartpack S controller's firmware upgrade via PC

Do following:

- If standard controller (242100.410), **slide out the controller's display**, Refer to section *"Accessing the Controller's Ethernet Port" on page 8*
- **Connect a PC to the Smartpack S controller** plugging one end of a standard Ethernet cable to the PC and the other end to the controller's Ethernet port
- **Start the "Eltek Network Utility"** program in the PC
- **Select the Smartpack S controller**; using the ENU program, check correct MAC and IP address and the correct firmware file <Smartpack S_(part #)_(version #)_APP.s19> Refer to topic *"Controller Access — Via Stand-alone PC" on page 16*
- **Click** on the **"Update Software"** button in the ENU program

For more detailed description, browse and search through the *Functionality Description* topic in the *PowerSuite* program's Help or in *Online Help*.

Overview LAN Devices and Firmware Files (PC - S19 Format)

The "*Eltek* Network Utility" (ENU) program will transfer the specific firmware file (s19-format) from a LAN connected computer to the device (or hardware platform).

LAN Device	File Name (examples)	File Type
Smartpack S	*Smartpack S*_(part #)_(version #)_APP.s19	Firmware upgrade Controller & embedded Web Adapter
Smartpack2 Master	SmartPack2_Master_405006.009_1.3_APP.s19	Firmware upgrade Controller & embedded Web Adapter
Compack	ComPack_xx.xx_APP.s19	Firmware upgrade Controller & embedded Web Adapter
Smartpack (Part 242100.113)	Rev4.2_SB70*WebPower*_APP.s19	Firmware upgrade embedded Web Adapter
Smartpack (Part 242100.118, HW v2)	*WebPower*_MCF5208_43_APP.s19	Firmware upgrade embedded Web Adapter
Smartpack (Part 242100.118, HW v3)	*WebPower*_MCF5235_43_APP.s19	Firmware upgrade embedded Web Adapter
WebPower Adapter SB72	Rev4.2_SB72*WebPower*_APP.s19	Firmware upgrade Web Adapter (stand-alone with Smartpack)
WebPower Adapter SB72	Rev2.0_SB72*WebPower*_APP.s19	Firmware upgrade Web Adapter (stand-alone with Aeon Gold)
WebPower Adapter SB72-512	*WebPower*_SB72-512_20_APP.s19	Firmware upgrade Web Adapter (stand-alone with Aeon Gold)
WebPower Adapter SB72	Rev2.0_SB72*WebPower*_APP.s19	Firmware upgrade Web Adapter (stand-alone with MCU)
WebPower Adapter SB72-512	*WebPower*_SB72-512_20_APP.s19	Firmware upgrade Web Adapter (stand-alone with MCU)

The "xx.xx" refers to the firmware file's version number.

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3. The Smartpack S Controller Panel Mounted

The *Smartpack S* controller is also available for panel mounting, part # 242100.415, e.g. on the system's front panel or cabinet's door. The panel mounted controller has **the same functionality as the standard**, power rack mounted controller, part # 242100.410. Find more information on chapter *"2. The Smartpack S Controller" on page 6 .*

SP S Ctrl PM – Location of Terminals, Ports, LEDs

The figure below shows the location of all terminal connections, signals, pin-out, etc, on the *Smartpack S* panel mounted[5] controller. For cable recommendations, refer to *"Figure 9. Connection Drawing Smartpack S Controller, panel mounted" on page 21*

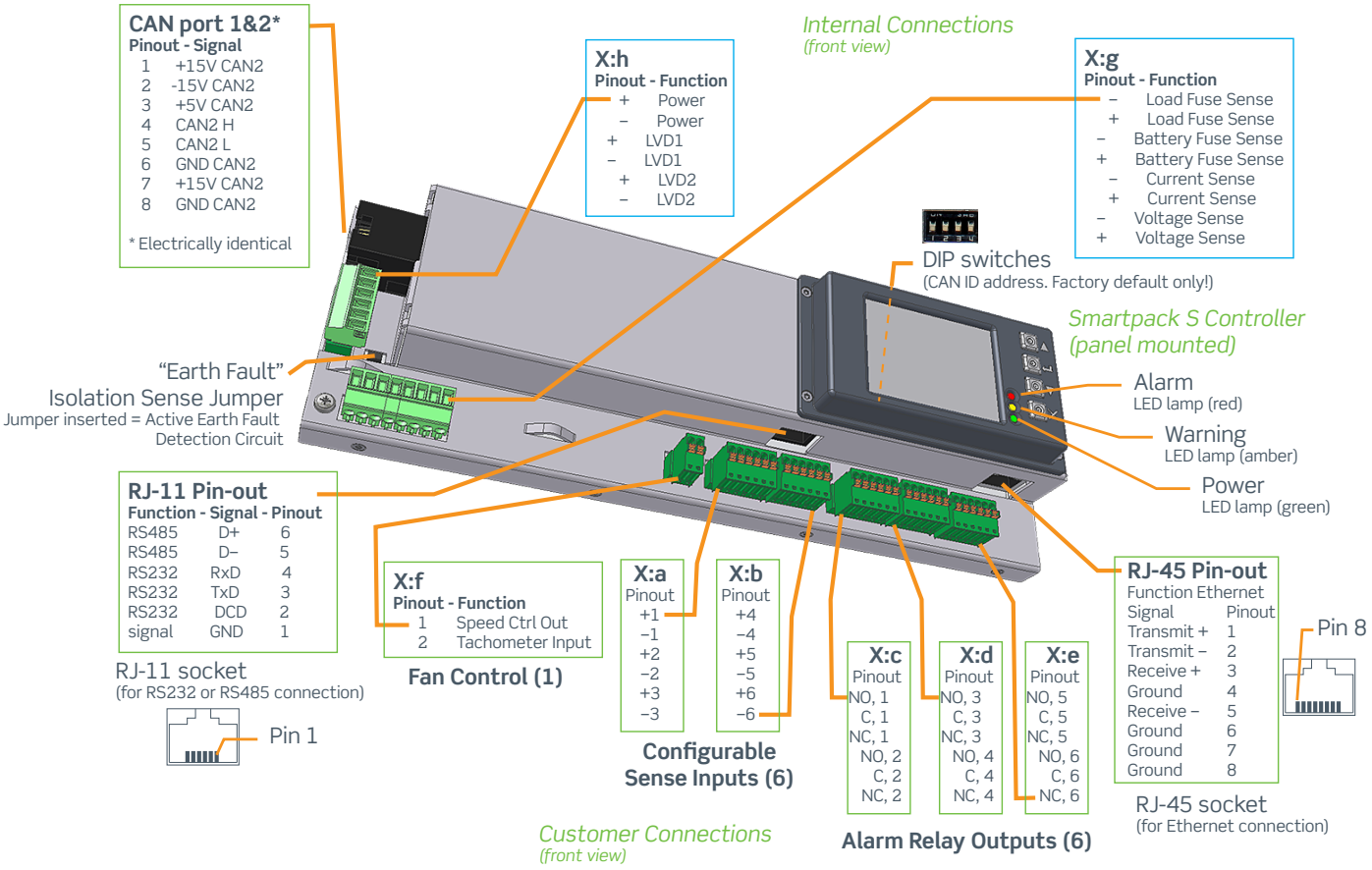

Figure 8. Location of terminal blocks, RS232/RS485 port, CAN ports, LED indicators, etc. in the Smartpack S panel mounted controller

Notice that you must disengage the *Smartpack S* controller from the front panel or door to be able to connect cables to the controller's terminals and ports. Read the section on *page 22 or* the power system's quick start guide or user documentation for information about how to access the controller's terminals.

For information about **input signals, climate control, earth fault detection**, etc read section *"Connection Drawing" on page 10*

5 The *Smartpack S* panel mounted controllers may also be available with the display on the left hand side and the terminals on the top and right hand side, instead of as shown in the figure above

SP S Ctrl PM – Connection Drawing

Use this drawing as a customer connection reference for all cabling to the *Smartpack S* panel mounted controller. You find the exact location of connection terminals, ports, etc. by referring to section *"SP S Ctrl PM – Location of Terminals, Ports, LEDs" on page 20*

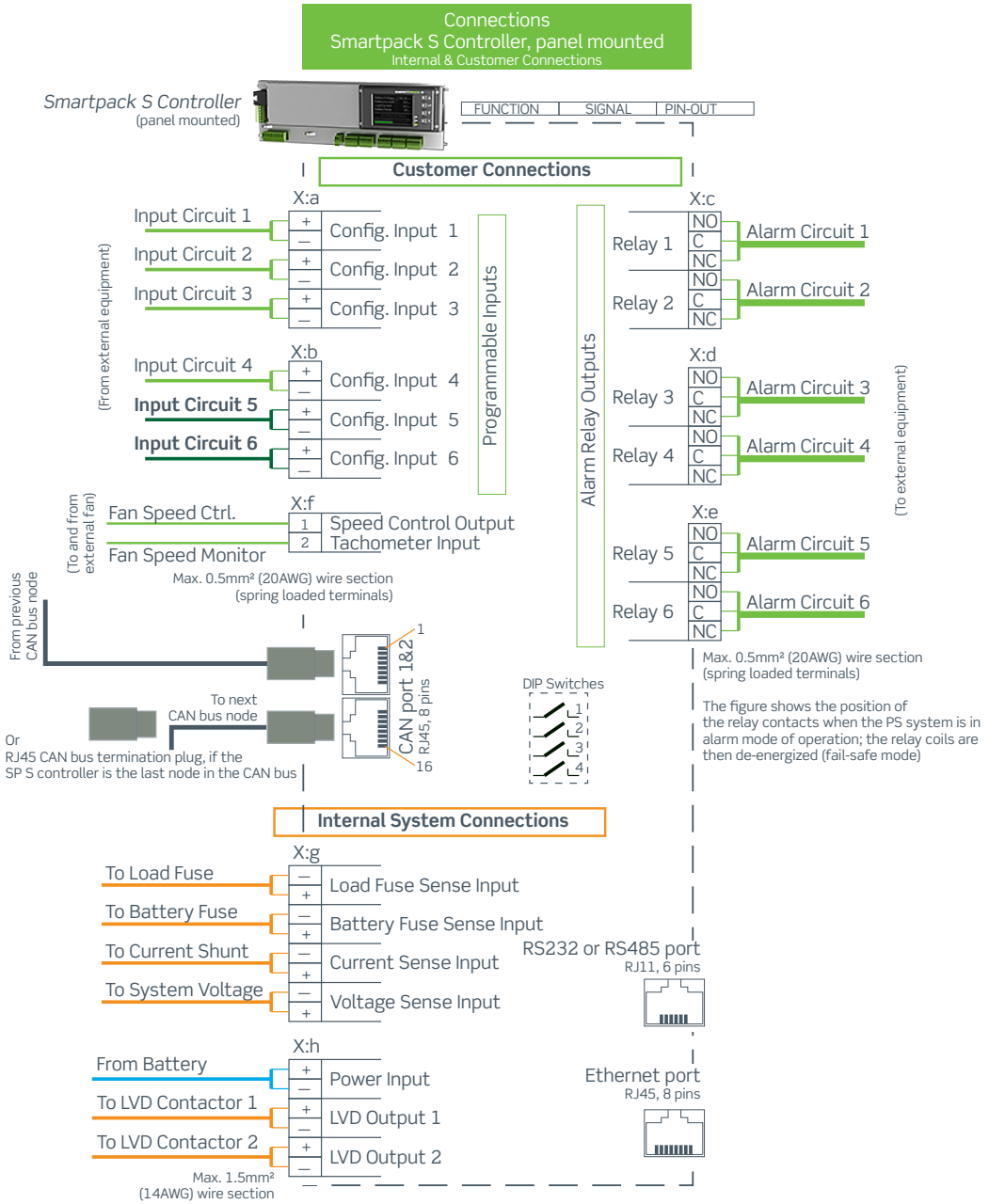

Figure 9. Connection Drawing Smartpack S Controller, panel mounted

The *Smartpack S* panel mounted controllers are usually shipped from factory with the default CAN bus address "1", as the DIP switches for CAN bus addressing are not accessible from outside. Notice that the DIP switches are accessible on the standard *Smartpack S* controllers, part # 242100.410. Refer to *Figure 2 on page 9* and section *"CAN Bus Addressing" on page 13.*

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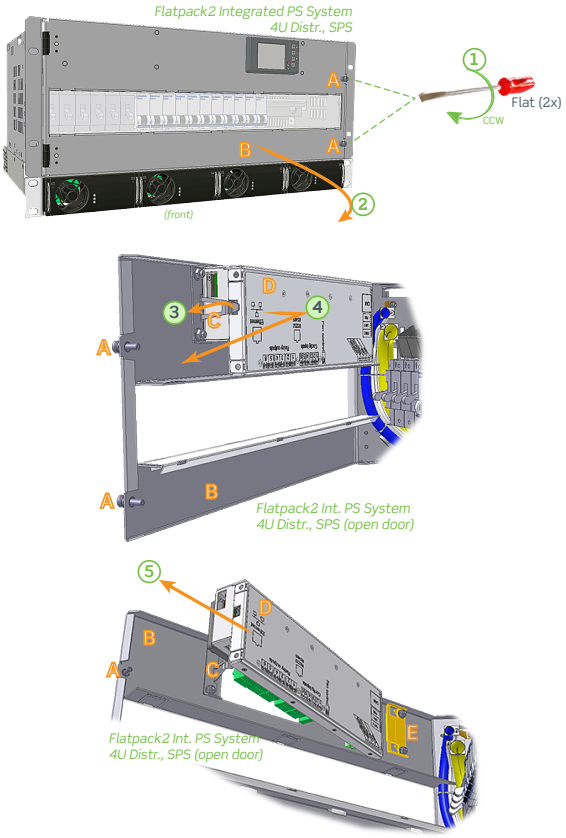
Removing and Mounting SP S Ctrl, Panel Mounted

To remove the *Smartpack S* panel mounted controller from the front door — e.g. to make cable connections, etc. — do the following:



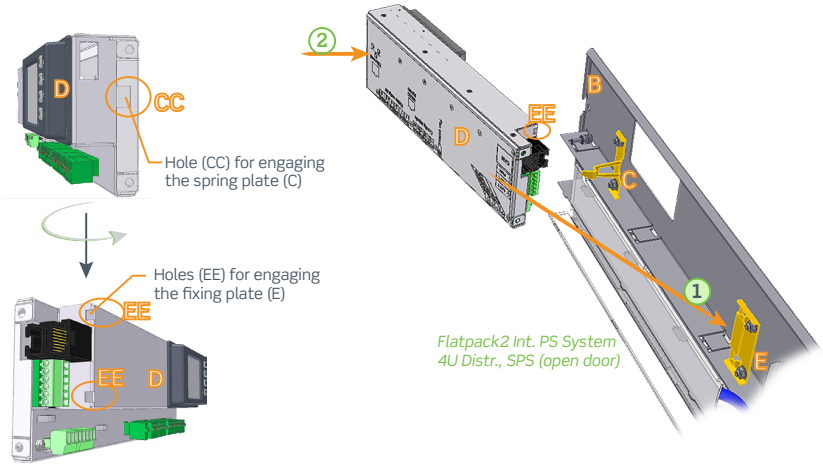
1. **Unscrew both screws** (A), using a flat screwdriver
2. Pull the front **door (B) open**
3. Hold the controller (D) with one hand, then use your fingers to press the metal spring plate (C) to the side and hold it there, then...
4. Pull the controller's side slightly outwards, to **disengage from the spring plate** (C), and...
5. **Remove the controller** (D) completely from the door (B), disengaging from the fixing plate (E)

Now you can access all the controller's terminals, ports, etc. and connect the cables. Read section *"SP S Ctrl PM - Location of Terminals, Ports, LEDs" on page 20*.

Figure 10. Steps to remove the Smartpack S panel mounted controller from the door

Mounting Smartpack S Controller, Panel Mounted

To mount the *Smartpack S* panel mounted controller on the front door — e.g. after making all cable connections, etc. — do the following:



1. Aim the controller's holes (EE) to the door's **fixing plate (E) until they engage**, then...
2. Press the other side of the controller towards the door, until the hole (CC) **engage in the door's spring plate** (C)

Figure 11. Steps to mount the Smartpack S panel mounted controller on the door

4. About Power System Configuration

The *Eltek* power supply system's functionality represents a vast **set of functions, characteristics or capabilities** implemented in the hardware and software of the controllers, control units and nodes connected to the system's CAN bus.

You can use following types of **user interfaces** to access the functions and parameters:

- The master **controllers' front panel display and keypad**
  using software menus and submenu options
- A **standard web browser**
  to access the CWUI firmware (Controller Web-based User Interface), a platform-independent user interface built-in the controllers
- The **PowerSuite program**
  A PC application run on computers using MS Windows operating systems

Logical Groups or Menu Options

All the mentioned functions, characteristics and parameters are **fully configurable**, and are presented in the controller's display (**Main Menu Options**) in following *task-oriented logical groups*:

1. System Status
2. System Configuration
3. Alarm Configuration
4. Commands
5. Logs and Reports
6. Statistics
7. Commissioning
8. Up/Download

Main Menu Options (Level 1)

Selecting a Main Menu option, will display **submenus** ("Sys. Status", "Sys. Config", etc.) with the functions, characteristics and parameters organized in following *system-oriented logical groups*:

- Power System
  - Mains
  - Generator
  - Rectifiers
  - Solar
  - DCDC
  - Rectiverters
  - Grid Inverter
  - Inverter
- Load
- Battery
- Inputs
- Outputs
- Control System
- OutDoor

WARNING!
To avoid false alarms and system malfunction, do not enable nor configure alarm monitors for hardware (Solar, Rectiverters, etc.) that is not installed in the power system.

For detailed functionality description, browse and search through the many topics of the Functionality Description of *Online Help*

1 - System Status options

Configuration **changes are not allowed** at System Status level. To make changes you have to access the System Configuration options, the Alarm Configuration options or similar.

This logical group presents the important system parameters, which indicate the status of the power system, such as number of battery banks, voltage, current, temperatures, fuse status, inputs and outputs status, and many similar parameters.

The presented parameters are organized in system-oriented groups: Power System, Mains, Generator, Rectifier, etc.

Refer to these topics (Mains, Rectifiers, etc.) for more information about the System Status parameters.

2 - System Configuration options

The options in this logical group let you change all the relevant system parameters, values and characteristics, such as temperature scales, system polarity (as represented on the display), language, system voltages, rectifiers and battery related values, and many similar parameters.

Configuration **changes are allowed** at this level, using a Pin-Code.

Notice:
The default Service Access Level password or Pin-Code is <0003>, which may be changed for security reasons.

The parameters are organized in system-oriented groups: Power System, Mains, Generator, Rectifier, etc.

Refer to these topics (Power System, Mains, Rectifiers, etc.) for more information about the System Configuration parameters.

3 - Alarm Configuration options

All the power system's **alarms are fully configurable**, and are implemented using Alarm Monitors (software modules). These software modules monitor input signals and logical states, and raise alarms when the signals reach certain limits or values.

Read more about *"Alarm Monitors" on page 31.*

The options in this logical group (the Alarm Configuration options) let you configure all the limits, values, etc. for the system's Alarm Monitors.

Configuration **changes are allowed** at this level, using a Pin-Code.

Notice:
The default Service Access Level password or Pin-Code is <0003>, which may be changed for security reasons.

The available Alarm Monitors are organized in system-oriented groups: Mains, Generator, Rectifier, Load, etc.

Refer to these topics (Mains, Rectifiers, etc.) for more information about the available Alarm Monitors parameters.
Read also the topic *"Typical Parameters for Alarm Monitors" on page 33*.

4 - Commands options

The options in this logical group let you issue or activate specific commands, such as resetting manual alarms, deleting the event log, starting battery tests, etc.
Issuing **commands is allowed** at this level, using a Pin-Code.

Notice:
The default Service Access Level password or Pin-Code is <0003>, which may be changed for security reasons.

The commands are organized in following groups:

- **System Commands**
- **Battery Commands**
- **Outputs Test**
  Read about *"Output Test Commands" on page 39*.

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5 - Logs and Reports options

The options in this logical group collect and present the system log, battery log, report of active alarms, etc.

The logs and reports are organized in following groups:

- Active Alarm Log
- Event Log
- Battery Test Log
- Inventory Report

Active Alarms Log

You can browse through the stored system alarm messages (or alarm log). The controller's alarm log may store up to 10 000 chronological events. Each log entry contains event text, event action, time and date. When the log is full, the oldest value is overwritten. The log is stored in EEPROM.

Example of Alarm Log data displayed in the controller's submenu:

Logs/Report > **Active Alarms**

#	Description	Value	Limit	Alarm Group	Output	Note
	BatteryTemp 1.1	42	30	----	---	
	SymmVolt 1.1	12,91	1,50	Alarm Group 15	----	
	RectifierError	1	1	Minor Alarm	-----	

Event Log

The Event Log is a record of system related events automatically registered by the system controller.

Example of Event Log data displayed in the controller's submenu:

Logs/Report > **Event Log**

#	Date and Time	Description	Event			Note
	yyyy.mm.dd hh:mm:ss	RectifierError	MinorAl:On			
	yyyy.mm.dd hh:mm:ss	SymmVolt 1.4	MajorAl:On			
	yyyy.mm.dd hh:mm:ss	LVD close	Info:On			
	yyyy.mm.dd hh:mm:ss	Door alarm	MajorAl:Off			
	yyyy.mm.dd hh:mm:ss	OutdoorTemp 81.1	Info:Off			

You can also save the Even Log to a storage media -- read about *"8 - Up/Download options (Data Storage Device)" on page 28* – or use *CWUI (Controller Web-based User Interface)* or *PowerSuite* to delete, print and save the log to a file in your computer.

Battery Test Log

The Battery Test Log is displayed in a results table; each row of data represents a battery test. Also, the battery quality, calculated by completed battery tests, and other test parameters are displayed.

Example of Battery Test Log table displayed in the controller's submenu:
Logs/Report > **Battery Test Log**

#	StartTime	Durat.	Typ	Descr	Amp	Q%	EndV	Note
	09:58	34	Manual	----------	-68	70%	45.49	----------

Using the *CWUI (Controller Web-based User Interface)* or *PowerSuite* you can also display the test results for a battery test in a line graph.

Inventory Report

The Inventory Report presents information that describes the power system, the site's name , serial number, installation and service dates, software name, etc.
Example of Inventory Report table displayed in the controller's submenu:
Logs/Report > **Inventory Report**

#	Description		Note
	Company		
	Site		
	Model		
	Install Date		
	Serial N		
	Service Date		
	Responsible		
	Message 1		
	Message 2		
	(Installed HW and SW info, part #, serial #, version #, etc.)		

6 - Statistics options

This logical group collects and presents relevant system data and calculated statistics, such as average results, peak values, etc.
Example of the Statistics table displayed in the controller's submenu:
Statistics

#	Description	Reset	Average	Peak	Note
	BatteryVoltage	☐ No	52,48	52,61	
	BatteryCurrent	☐ No	-35	0	
	Battery Temp	☐ No	41	0	
	Load Current	☐ No	35	50	
	Rectifier Current	☐ No	75	120	
	Mains Volt 1	☐ No	225	235	

7 - Commissioning options

This logical group presents a generic description of the steps required to carry out commissioning tasks of the power system.
Refer also to the system's user documentation, and to the Commissioning Procedure pull-out list in the system's quick start guide.

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8 - Up/Download options (Data Storage Device)

The options in this logical group let you upload firmware from the controller's data storage device to connected controllers and control units, as well as download or save system related logs, etc. to the data storage device.

Notice:
The *Smartpack2 Master* controller uses an external SD card as data storage device, and the *Smartpack S* controller uses embedded Flash Memory.

In addition to firmware, this group's options offer you the possibility of uploading and saving system configuration files to the controller's data storage device.

Uploading and downloading **is allowed** at this level, using the Pin-Code for the **Service Access Level.**

Notice:
Using the *CWUI (Controller Web-based User Interface) or PowerSuite* you can also up/download to other storage media (e.g. computer hard discs)

The Up- and Download options are organized in following groups:

- **Save Event Log**
  (system related log)
  A command that saves to the controller's data storage device a log of power system events automatically registered by the system controller.
  Read about *"5 - Logs and Reports options" on page 26*
- **Save Data Log**
  (control unit related log)
  A command that saves to the controller's data storage device a log of key system data (voltages, current and temperature values) registered by the system controllers, or by other connected control units (e.g. I/O Monitor, Mains Monitor)
- **Save Energy Log**
  (system related log)
  A command that saves to the controller's data storage device a log of the power system's energy usage, (Wh).
- **Save /Load Config**
  A command that saves to the controller's data storage device a binary formatted file <UNIT_nn.HEX> which contains the controller's or any connected CAN unit's System Configuration, with all the specific parameters and settings.
  Also, you can upload a similar, specific System Configuration file <UNIT_nn.HEX> to the controller or to any connected CAN unit, e.g. for automatic configuration of specific functions

  The "nn" in the file name specifies the unit's CAN bus address.

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- **Software Upgrade**
  which offers you to upgrade the firmware in connected controllers and control units, by uploading files stored in the controller's data storage device.
  Read topic *"SD Card Storage - Overview Firmware Files (Binary Format)" on page 29,* or topic *"Flash Memory Storage" on page 30*

  Example of some of the available options in controller's submenu:

  Up/Download › Software Upgrade

#	Description	SW Info				Note
	Compack 11	405006.009	0A.M			
	Smartpack1	402073.009	3.05E			
	I/O Unit 1	402088.009	3.01			

SD Card Storage - Overview Firmware Files (Binary Format)

You can store binary files in the *Smartpack2 Master* controller's SD card (data storage device) and use them for firmware upgrading of controllers and control units, as well as for exporting and importing configuration files.

> Notice:
> All firmware upgrade and configuration files stored in the SC card must have specific file names.

The SD card uses the 8.3 file name format. Before storing the files on the SD card, you must rename them, so that they conform to the specific file names described below.

For example, if you receive the file "SmartPack2_Basic_405007.009_V1.1.mhx" to upgrade your *Smartpack2 Basic* controller firmware to version 1.1, you must first rename the file to exactly "SP2BAS.MHX", then copy the file to the SD card and finally insert the SD card in the *Smartpack2 Master* controller to start the firmware upgrade process.

#	CAN Node	File Name	File Type	CAN Node Type
	Smartpack2 Master	SP2MAST.BIN	Firmware upgrade	Controller
	Smartpack2 Basic	SP2BAS.MHX	Firmware upgrade	Controller
	Smartpack2 Basic Industrial	SP2BASIN.S19	Firmware upgrade	Controller
	Smartpack	SP.MHX	Firmware upgrade	Controller
	Smartnode	SMARTNOD.MHX	Firmware upgrade	Control Unit
	Battery Monitor	BATTMON.HEX	Firmware upgrade	Control Unit
	Load Monitor	LOADMON.HEX	Firmware upgrade	Control Unit
	AC Mains Monitor	MAINSMON.HEX	Firmware upgrade	Control Unit
	I/O Monitor	IO_UNIT.HEX	Firmware upgrade	Control Units: I/O Monitor, Monitor2 & Monitor3
	Flexi-Monitor	FLEXIMON.S19	Firmware upgrade	Control Unit
	Any node	UNIT_aa.HEX	Configuration File (Save/Load)	All types

The "aa" refers to the CAN bus address or ID number.
E.g. "UNIT_82.HEX" could be the configuration file for I/O Monitor with CAN bus address 82.

When upgrading the firmware of controllers and control units — if several units of the same type are connected to the CAN bus — the *Smartpack2 Master* controller will request you to specify the CAN bus ID number of the unit to upgrade.

Flash Memory Storage

You can store files in the Smartpack S controller's embedded Flash Memory (data storage device) and use them for firmware upgrading of controllers and control units, as well as for storage of logs, language codes, and for exporting & importing configuration files.

When upgrading the firmware of controllers and control units — if several units of the same type are connected to the CAN bus — the Smartpack S controller will request you to specify the CAN bus ID number of the unit to upgrade.

FTP Client

The files stored in the controller's Flash memory are also accessible from a computer, via the FTP client embedded in the controller's web-based user interface.

NOTICE:
You must use the "Admin" log in account, to be able to use the embedded FTP client.

An external FTP client, such as e.g. "FileZilla" (freeware) — running on a computer connected to the controller's Ethernet port — can also be used to access the files on the controller's embedded Flash memory.

WARNING:
It is not recommended to use the FTP client embedded in Windows Explorer.

WARNING:
Before uploading files to the Flash memory (4MB), check that there is enough storage space. Also, consider deleting files that are no longer necessary.

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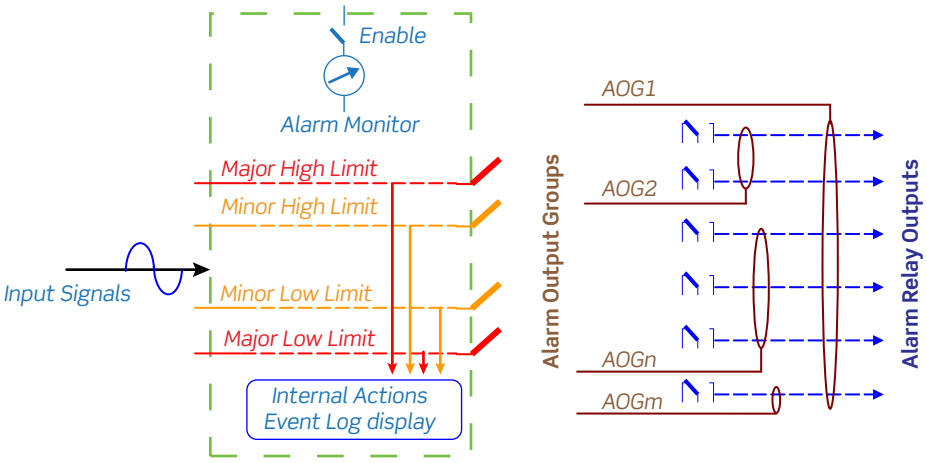
Alarm Monitors

Alarm monitors are software modules used by the system controller to **measure system internal and external input signals or logical states**.

When an alarm monitor is enabled, it **compares the measured parameter with the preprogrammed values or limits**, and raises an alarm in the event of the measured parameter reaching one of the limits.

When this event occurs, the alarm monitor stores the event in the Event Log, initiates an internal action and activates an output group.

Internal preprogrammed actions may be battery current limiting, boost inhibiting or similar. The generated alarm **activates a preprogrammed group of relay outputs** (an alarm output group, AOG).



The alarm monitors' most commonly used configuration parameters are:

(Refer to the "*Alarm Monitor dialogue boxes*" topic in *PowerSuite Online Help*)

- **Type of input**
  The measured Input Signal can be
  analogue (e.g. a voltage),
  logical (e.g. an open or closed contact) and
  numeric (e.g. number of rectifiers, % remaining capacity, etc.)
- **Alarm Monitor activation**
  You have to *Enable* the alarm monitor so that it functions
- **Type of alarm reset**
  You can select whether the alarm generated by monitor can be reset *manually*, or automatically (when the event that caused the alarm is no longer true)

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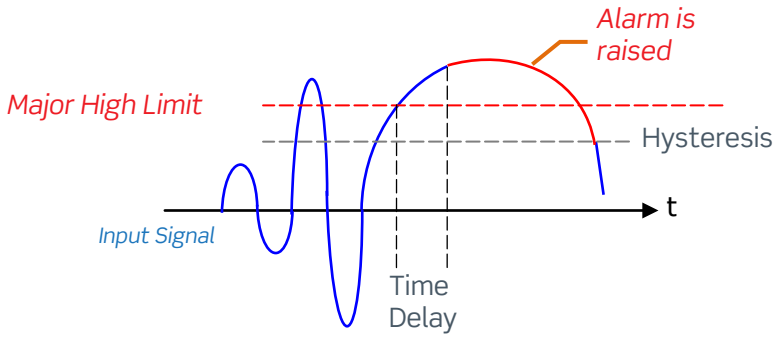
- **Hysteresis and Time delay**
  When the input signal has reached a certain limit or criteria for a *certain period of time*, the alarm monitor raises an alarm. This period of time is called *Time delay*.
  You can also enter a *hysteresis* value to prevent the alarm monitor from unwanted rapid "switching", when the input signal is around the limit or criteria.



  For example: A *MajorHigh Limit* is set to 57.00VDC, with a Hysteresis of 0.10VDC and a Time delay of 5 seconds.

  An input signal of 57.08VDC lasting 3 seconds will not cause the alarm monitor to raise an alarm.

  The alarm will only be generated when the input signal is over 57.00VDC for a longer period of time than 5 seconds (the *Time delay*).

  The alarm will only be switched off when the input signal is lower than 56.90VDC (the *hysteresis*).

- **Monitored Limits and Events**
  Analogue and numeric alarm monitors compare the measured input with from *one to four user-defined values or limits*; two above normal value (*Major High* and *Minor High*) and two below normal value (*Minor Low* and *Major Low*). The type and number of internal actions (events) are usually defined from factory.
  Logical alarm monitors only compare the measured input signal with a logical state (normally open or closed). The user can define the alarm group that the monitor will activate when the input signal is not in the normal state.

- **Alarm output groups**
  For each value or limit, you can select *which alarm output group* (AOG) the alarm monitor will activate, in the event the measured input reaches the specific limit

- **Measured Average Value**
  The alarm monitor stores all input signal measurements and performs average calculations every minute. Then, the monitor continuously displays the *input signal average value*, and the period of time the input signal has been measured. You can restart the monitor's average calculations.

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- **Measured Peak Value**
  The alarm monitor stores all input signal measurements. Then, the monitor continuously displays the *input signal peak value*, since the measurements started. You can restart the monitor's peak value measurements.

In addition, you can configure the alarm monitors with a description of the alarm monitor and other configuration parameters.

Read also the "*Alarm Monitor dialogue boxes*" topic in *PowerSuite Online Help*.

Types of Alarm Monitors

The power system's controller uses following types of alarm monitors, determined by the monitor's type of input signal:

- **Logical Alarm Monitors** (L1)
  (monitor logical states such as Open/Closed or Yes/No)
- **Numeric Alarm Monitors** (N1, N2%)
  (monitor numeric values such as the number of rectifiers, errors, the % battery capacity, etc)
- **Analogue Alarm Monitors** (A2, A4)
  (monitor analogue values such as voltage, current, etc)
- **Special Alarm Monitors** (LVD)
  (monitor the battery voltage and controls the LVD contactors)

Analogue and numerical alarm monitors compare the measured input with one to four user-defined values or limits; two above normal value (*Major High* and *Minor High*) and two below normal value (*Minor Low* and *Major Low*).

Logical alarm monitors only compare the measured input signal with a logical state (normally open or close). The user can define the type of event the monitor activates when the input signal is not in the normal state.

Using *PowerSuite* or the controller's web-based interface (CWUI), you can change the default alarm monitor's name (Description). This is useful for alarm monitors of the type "ProgInput X.Y", but you should be careful changing the name of other system alarm monitors.

Read also the "*Alarm Monitor dialogue boxes*" topic in *PowerSuite Online Help*.

Typical Parameters for Alarm Monitors

The power system's controller uses following types of alarm monitors, determined by the monitor's type of input signal:

- *Logical Alarm Monitors* (L1)
- *Numeric Alarm Monitors* (N1, N2%)
- *Analogue Alarm Monitors* (A2, A4)
- *Special Alarm Monitors* (LVD)

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The examples below show typical configuration parameters for these alarm monitors.

Parameters with "(a), (b)...(x)" references in the Note column are described in more detail at the end of this section.

Parameters for Logical Alarm Monitors (L1)

Example to monitor logical states such as Open/Closed or Yes/No.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or "All Levels" or "MajorHigh Only" (a)
	Hysteresis	000		(not applicable)
	TimeDelay	7	Seconds	Selects among delay time options (b)
	MinorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate

Parameters for Numerical Alarm Monitors (N1)

Example to monitor numeric values such as the number of rectifiers, errors, etc.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or "All Levels" or "MajorHigh Only" (a)
	Hysteresis	0000	Units	(not applicable)
	TimeDelay	2	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	001	Units	Upper limit
	MajorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	001	Units	Lower limit
	MinorHigh AlarmGroup	Minor Alarm		Selects the alarm group to activate

Parameters for Numerical Alarm Monitors (N2%)

Another example to monitor numeric values such as the percent of battery capacity, etc.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or "All Levels" or "MajorHigh Only" (a)
	Hysteresis	2	%	(b)
	TimeDelay	10	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	95	%	Upper limit
	MajorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	80	%	Lower limit
	MinorHigh AlarmGroup	Minor Alarm		Selects the alarm group to activate

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Parameters for Analogue Alarm Monitors (A2)

Example to monitor analogue values such as voltage, current, etc with 2 limits.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or “All Levels” or “MajorHigh Only” (a)
	Hysteresis	100	Amp	(b)
	TimeDelay	5	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	5000	Amp	Upper limit
	MajorHigh AlarmGroup	Major Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	4000	Amp	Lower limit
	MinorHigh AlarmGroup	Minor Alarm		Selects the alarm group to activate

Parameters for Analogue Alarm Monitors (A4)

Example to monitor analogue values such as voltage, current, etc with 4 limits.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	Manual Reset	Disabled		Or “All Levels” or “MajorHigh Only” (a)
	Hysteresis	10	Volt AC	(b)
	TimeDelay	7	Seconds	Selects among delay time options (b)
	MajorHigh AlarmLevel	280	Volt AC	Major High upper limit
	MajorHigh AlarmGroup	Mains Alarm		Selects the alarm group to activate
	MinorHigh AlarmLevel	260	Volt AC	Minor High upper limit
	MinorHigh AlarmGroup	Mains Alarm		Selects the alarm group to activate
	MinorLow AlarmLevel	100	Volt AC	Minor Low lower limit
	MinorLow AlarmGroup	Mains Alarm		Selects the alarm group to activate
	MajorLow AlarmLevel	80	Volt AC	Major Low lower limit
	MajorLow AlarmGroup	Mains Alarm		Selects the alarm group to activate

Parameters for Special Alarm Monitors (LVD)

Example to monitor the battery voltage and control the LVD contactors.

#	Description	Value	Unit/Label	Note
	Monitor – Enable/Disable?	☐	Enable	Activates or deactivates the alarm monitor
	MainsIndependent Enable/Disable?	☐	Enable	(c)
	Temp. Dependant Enable/Disable?	☐	Enable	(d)
	Disconnect Voltage [V]	43,00		(e)
	Reconnect Voltage [V]	48,00		(f)
	Delay After Disconnect [seconds]	000		Selects among delay time options (g)
	AlarmGroup	LVBD		
				Selects the alarm group to activate
				Minor Low lower limit
				Selects the alarm group to activate
				Major Low lower limit
				Selects the alarm group to activate

The LVD alarm monitors “observe” that the battery voltage (input signal) is within limits, otherwise they activate the LVD contactors (alarm group).

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a. Manual Reset

The power system can be configured with *automatic* or *manual* alarm reset.

When *Manual Alarm Reset* is enabled -- and the alarm condition no longer exists -- the operator **must reset the alarm manually**, via the power systems user interface (web GUI or controller's front keys).

When the Manual Alarm Reset is disabled, then the *Automatic Alarm Reset* is enabled (default). In this case, when an alarm condition no longer exists, the **main controller will automatically reset the alarm**, by deactivating the alarm lamps and relays to indicate that normal operation is established.

b. Hysteresis and Time Delay

Read also topic *"Alarm Monitors" on page 31*

c. Mains Independent

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

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

d. Temperature Dependent

Used with LVD contactors that disconnect the battery bank (LVBD).

Check this option if you want that the LVD alarm monitor will reconnect the LVBD contactor when the battery temperature is lower than the temperature limit configured in the "BatteryTemp" alarm monitor.

e. Disconnect Voltage

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

f. Reconnect Voltage

Enter a numeric value for the battery voltage reconnection limit. When the Mains supply is ON again, the power system output voltage increases to this limit; then the alarm monitor will reconnect the LVD contactor.

g. Delay Time after Disconnect

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

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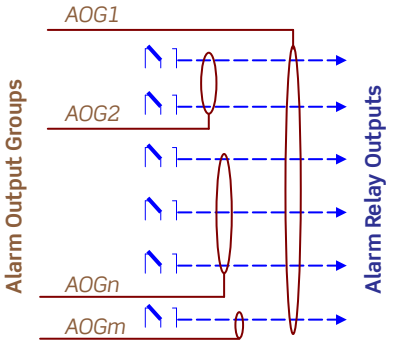
Alarm Output Groups

An Alarm Output Group (AOG) is a **user defined software assignment** that consists of grouping together all the **outputs** that **always are activated at the same time**.

The outputs -- alarm relay outputs and or latching contactors (LVLD and LVBD) – are distributed among the power system's controllers and control units.

In order to activate the alarm relay outputs and latching contactors (LVLD and LVBD) in the power supply system, **you have to assign them to output groups** (AOG).

Output relay assignment and output relay mapping are similar terms, synonyms.



Read also the "*Alarms Overview Outputs tab*" topic in *PowerSuite Online Help*.

The power supply system uses at least **20 different alarm output groups** (AOG); 18 for assignment of alarm output relays, and 2 or more for assignment of LVD latching contactors.

Usually, the **first seven** alarm output groups have alarm relay outputs already assigned to them from factory (**Factory Default Settings**).

Typically, alarm output groups 8 through 18 are listed as "*Alarm Group 8*", "*Alarm Group 9*"... to "*Alarm Group 18*", but they have no alarm relay outputs assigned.

Alarm output groups "LVBD OG" and "LVLD1 OG" have usually LVD battery and load latching contactors assigned from factory.

Notice:
Usually, most controllers and I/O Monitors are physically equipped with relay outputs.

The outputs of *Smartnode* control units are telephone numbers, instead of relay outputs. The assignment procedure is the same, but you group the phone numbers and assign them to Alarm Output Group.

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The example below shows typical Alarm Output Group assignment in a *Smartpack S*-based system.

Alarm Configuration › Outputs

#	Description, Alarm Groups	Output	1	2	3	4	5	6	LVBD	LVLD1	Note
1	Major Alarm, AOG		☑	☐	☐	☐	☐	☐			
2	Minor Alarm, AOG		☑	☐	☐	☐	☐	☐			
3	Mains Alarm, AOG		☑	☑	☐	☐	☐	☐			
4	Fuse Alarm, AOG		☑	☐	☑	☐	☐	☐			
5	High Battery Alarm, AOG		☑	☐	☐	☑	☐	☐			
6	Low Battery Alarm, AOG		☑	☐	☐	☐	☑	☐			
7	Rectifier Alarm, AOG		☑	☐	☐	☐	☐	☑			
8	Gen-Set AOG		☑	☑	☐	☐	☐	☐			
9	Alarm Group 9		☐	☐	☐	☐	☐	☐			
10	Alarm Group 10		☐	☐	☐	☐	☐	☐			
	---		☐	☐	☐	☐	☐	☐			
	---		☐	☐	☐	☐	☐	☐			
17	Alarm Group 17		☐	☐	☐	☐	☐	☐			
18	OutpBlocked, AOG		☐	☐	☐	☐	☐	☐			
19	LVBD, AOG		☐	☐	☐	☐	☐	☐	☑		
20	LVLD, AOG 1		☐	☐	☐	☐	☐	☐		☑	
	-----		☐	☐	☐	☐	☐	☐			
	-----		☐	☐	☐	☐	☐	☐			
	-----		☐	☐	☐	☐	☐	☐			

In the example above,

- Alarm relay output 1 is used for external common alarm signalling
- Alarm Output Group 18, “OutpBlocked, AOG”
  If an external warning is necessary, you can assign output relays to the “OutpBlocked, AOG” group, e.g. to activate a lamp or alarm bell when the alarm output relays are blocked.
  Read more in topic *"Alarm Outputs Isolation (Output Blocked)" on page 39*
- Alarm Groups 9 through 17 are unused, and can be assigned when required

Output Test Commands

This logical subgroup lets you issue or activate **specific commands to test the activation of the alarm output relay contacts**. For example, following commands might be available in *Smartpack S* controller's submenu:

Commands › Output Test

#	Description	Action	Unit/Label	Note
	Output Relay # 1	☐	No	Tests alarm relay number 1
	Output Relay # 2	☐	No	
	Output Relay # 3	☐	No	
	Output Relay # 4			
	Output Relay # 5			
	Output Relay # 6			

The Output Test functionality enables to test and verify the circuits connecting external equipment to the power system's alarm relay outputs.

The Output Test command will toggle the alarm relay contacts -- regardless of the position they are at the moment -- for a certain period of time (entered in the "Output Test Timeout (sec)" in *PowerSuite*).

Issuing **commands is allowed** using a Pin-Code.

Notice:
The default Service Access Level password or Pin-Code is <0003>, which may be changed for security reasons.

Alarm Outputs Isolation (Output Blocked)

When the user activates the "OutpBlocked" command, system alarms will NOT trigger any alarm output group (similar to relay isolation), except for the "OutpBlocked, AOG" group, which is always Alarm Output Group 18.

If an external warning is necessary, you can assign output relays to the "OutpBlocked, AOG" group, e.g. to activate a lamp or alarm bell when the alarm output relays are blocked.

The "OutpBlocked" command will reset all alarm output groups to normal status, and possible new alarms will NOT trigger any alarm output groups (output relays activation is blocked), except for AOG 18. Also, this command will always activate Alarm Output Group 18 to facilitate external warning of this function being active.

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