

User's Guide

Smartpack2 Basic Controller



Monitoring and Control Units

Powerpack, Flatpack2 & Minipack

DC Power Supply Systems

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* DC power supply system.

General Precautions



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.

G1



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

G2

Environmental Precautions



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 rectifiers, as they can reach **extreme temperatures** under load and normal operation.

E1



WARNING: The installer/user is responsible for ensuring that the DC 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 “*Guidelines for Lightning and Surge Protection*”, doc. 2024623.

E2



WARNING: The electronics in the power supply system are designed for indoor, clean environment. When installed in outdoor enclosures, it is important to keep the door closed during operation, and 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 DC power system. Follow the instructions given in “*Generic Guidelines Environmental Protection.*”, doc. 2038879.

E3

Precautions during Installation



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.

I1



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.

I2



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

I3



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.

I4



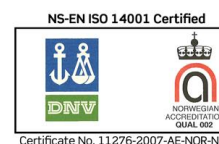
WARNING: 60V and higher DC power systems are only to be installed in Restricted Access Locations (RAL). Access must be limited by use of tool, i.e. lock and key.

I5

Information in this document is subject to change without notice and does not represent a commitment on the part of *Eltek*.

No part of this document may be reproduced or transmitted in any form or by any means — electronic or mechanical, including photocopying and recording — for any purpose without the explicit written permission of *Eltek*.

Copyright ©: *Eltek*, 2014



Part number for *Smartpack2 Basic Controller*: 242100.501

350021.013 Issue 2.0, 2014 Jan

Published 2014-03-11

mafenno

Table of Contents

1. Introduction	5
About this Guide	5
System Diagram — <i>Flatpack2</i> Power System w/SP2.....	5
2. The Smartpack2 Basic Controller.....	6
Key Features	6
Block Diagram.....	6
Location of Terminals, Ports, LEDs.....	7
“Earth Fault” Isolation Jumper	7
Installation of Smartpack2 Basic Controller	8
Fastening / Unfastening Inside-Mounted Controllers.....	8
Fastening / Unfastening Top Cover-Mounted Controllers	9
Connection Drawing	10
CAN Bus Termination	11
CAN Bus Cabling	11
Configuration.....	12
CAN Bus Addressing	12
System Configuration	13
Logical Groups or Menu Options	13
Firmware Upgrade Controller.....	14
Technical Specifications	15
Endnotes.....	15

1. Introduction

The *Smartpack2 Basic* controllers are powerful and cost-effective modules used as slave controllers in *Smartpack2*-based power systems.

About this Guide

This booklet describes the *Smartpack2 Basic* controller's building blocks, external connections and technical specifications.

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

For detailed functionality description, browse and search through the *Functionality Description* topic in *PowerSuite Online Help* or [CWUI Online Help](#). Notice that you must **log in to access Online Help** (contact your *Eltek* representative). The guide for the *Smartpack2 Master* controller (Doc# 350020.013) might also be helpful.

System Diagram — Flatpack2 Power System w/SP2

The generic *Smartpack2* (SP2) distributed control system — used in *Flatpack2* PS systems — monitors and controls the whole system, and consists of the *Smartpack2 Master* (SP2M) controller, the *Smartpack2 Basic* (SP2B) controller and the *I/O Monitor2* CAN node.

The *Smartpack2 Master* serves as the local user interface between you and the system. The *Smartpack2 Basic* monitors and controls the power system's internal wiring and supplies the CAN bus with power. The *I/O Monitor2* CAN node provides the system with input monitoring and output controlling signals. The SP2M Controller's Web-based User Interface (CWUI) enables system configuration via a standard web browser.

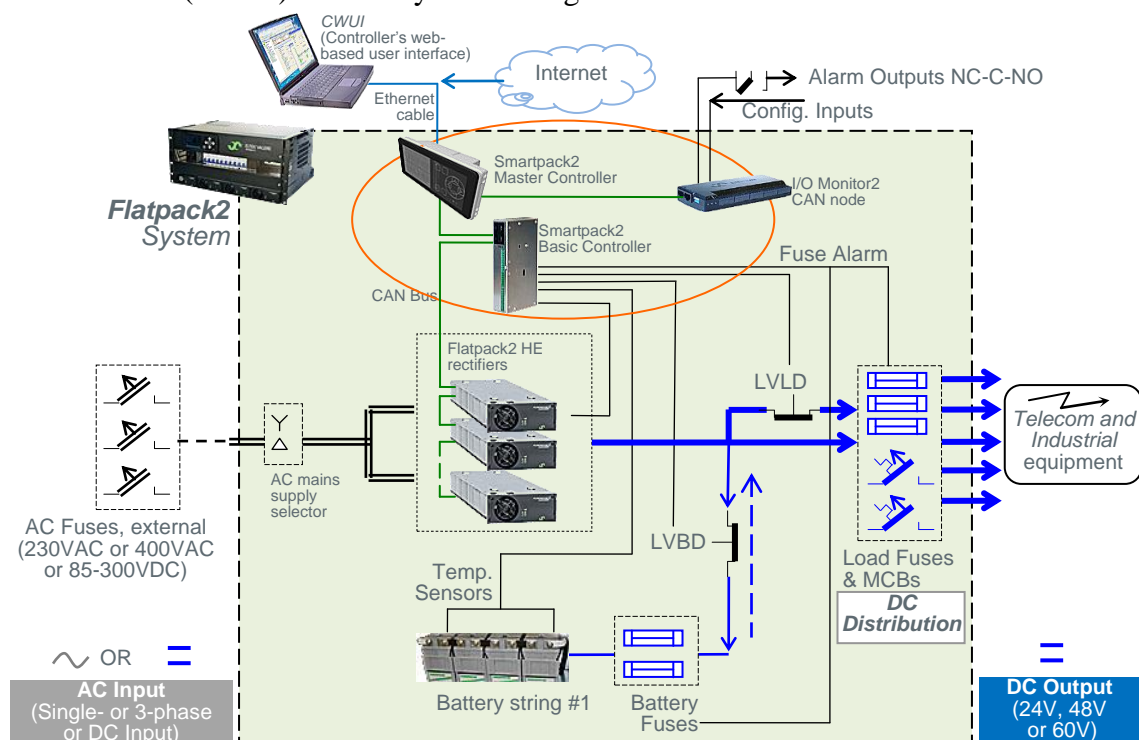


Figure 1 Typical Flatpack2 DC power system for telecom and industrial equipment, fed from external AC mains or DC supply. It consists of rectifiers in power shelves, master and basic controllers, DC distribution, etc.

2. The Smartpack2 Basic Controller

The *Smartpack2 Basic* controllers are powerful modules used as slave controllers in the distributed control system of *Smartpack2*-based power supply systems.

They are developed for monitoring and controlling of the power system's internal functionality and to supply distributed power for connected CAN nodes. They can also operate in stand-alone mode, maintaining normal operation of the system, thus providing redundancy and improving system reliability.

Key Features

A wide range of features are implemented in the *Smartpack2 Basic* controller:

- ✓ LEDs for local visual alarming (Major, Minor, Power ON)
- ✓ Supplies distributed power for CAN bus nodes
- ✓ 2 sense inputs for internal monitoring, 1 voltage sense and 1 current sense
- ✓ 2 configurable inputs for load and battery fuse monitoring
- ✓ 3 configurable multipurpose inputs (temperature, digital inputs or analog signals)
- ✓ 3 LVD control outputs, configurable for latching and non-latching contactors
- ✓ Up to 8 *Smartpack2 Basic* controllers may be connected the CAN bus
- ✓ CAN bus addressing via DIP switches
- ✓ Configuration via the master controller's front keys or via a standard web browser, using the controller's web-based interface (CWUI)
- ✓ Firmware upgrade via the CAN bus (page 14)

Read also chapter “Technical Specifications”, page 15, for more details.

Block Diagram

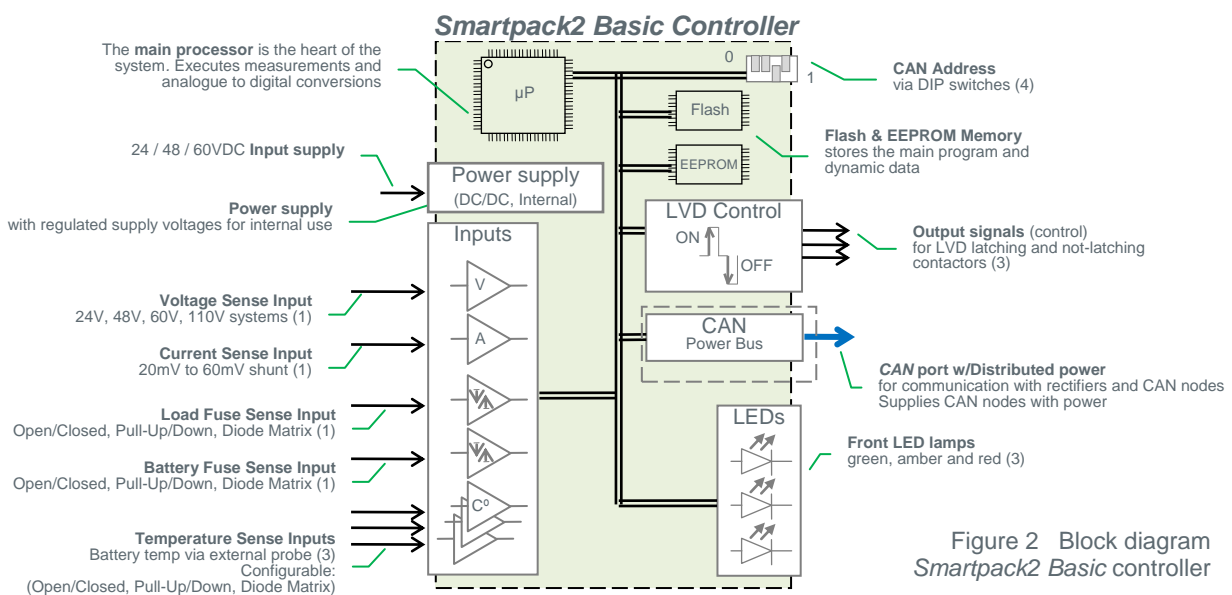


Figure 2 Block diagram
Smartpack2 Basic controller

Location of Terminals, Ports, LEDs

For a complete list of signals, pin-out, etc., refer to the chapter “Connection Drawing”, on page 10.

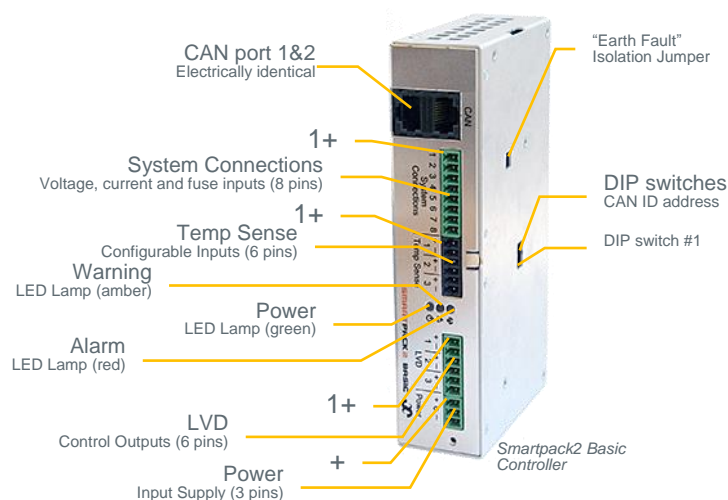


Figure 3 Location of pluggable terminal blocks, DIP switches, “Earth Fault” jumper, CAN ports and LED indicators in the *Smartpack2 Basic* controller. (The pluggable terminals may be black or green)

CAN port 1 and 2 are electrically identical, and are used to enable connection of the CAN bus incoming and outgoing CAT5 cables, or the RJ45 CAN bus termination plug.

LED Indicator	Illumination Status	Description
Power	OFF	The controller has NO supply
	ON green	Supply healthy
	Flashing Green	Distributed Power Fault
Warning	OFF	No Warning
	ON amber	Warning (Minor alarm, non-critical alarm)
	Flashing amber	Communications Fault
Alarm	OFF	No Alarm
	ON red	Alarm (Major Alarm, critical alarm)
	Flashing red	SW Fault / Boot Loader Mode

Table 1 Description of the *Smartpack2 Basic* controller’s LED illumination status

“Earth Fault” Isolation Jumper

The “Earth Fault” Isolation Sense jumper, see Figure 3, page 7, can be 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 [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 using PowerSuite (see [Online Help](#)) or the master controller’s keypad or via its web-based user interface (CWUI).

Installation of Smartpack2 Basic Controller

The *Smartpack2 Basic* controller is **always factory installed** in all *Flatpack2* PS systems that implement the “*Smartpack2* Distributed Control System”. In integrated systems, it is installed either under the subassembly’s top cover or inside the subassembly. The length of the controller’s connection cables is suitable for mounting in both locations. In cabinetized systems, the controller is mounted someplace inside the cabinet.

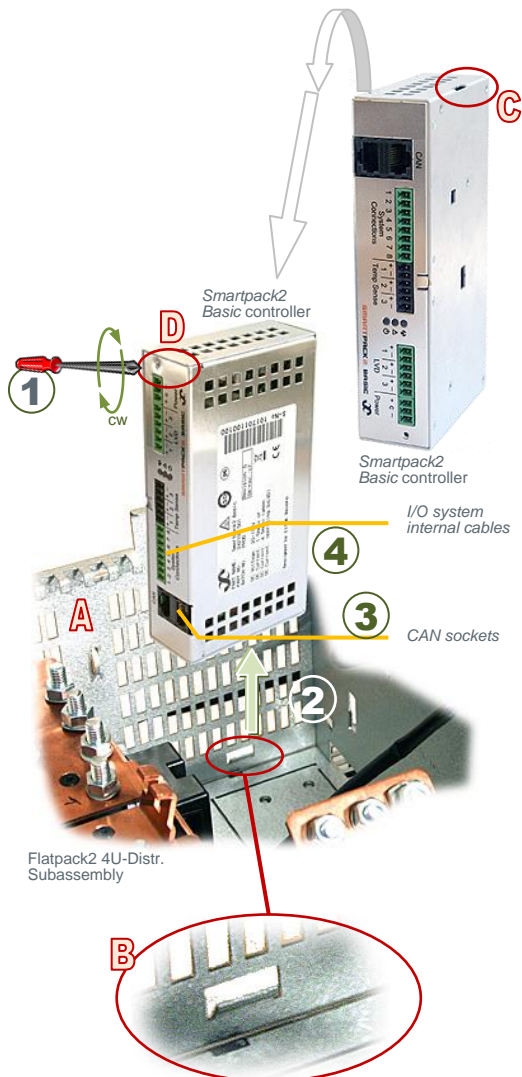
If you need to replace the *Smartpack2 Basic* controller with a new one, always follow the precautions relevant for installation, commissioning and general handling of the *Smartpack* and *Smartpack2*-based DC power systems.



CAUTION:

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; otherwise the warranty may be invalidated. Please, **read the user documentation carefully** before installing and using the equipment, as installation and operation is to be performed as described in it.

Fastening / Unfastening Inside-Mounted Controllers



You fasten the *Smartpack2 Basic* controller using two dedicated fixing tabs (A)(B) inside the DC power cabinet or subassembly, and a slot (C) and screw hole (D) on the controller, refer to Figure 4, page 8.

To unfasten the *Smartpack2 Basic* controller from the power system, switch OFF the system to make it completely voltage free (read “A” in “Endnotes”, page 15), and

Power is OFF!

1. Loosen the top fixing tab screw from the screw hole (D)
2. Lift the controller carefully upwards, (the slot (C) disengage from the lower fixing tab (B))
3. Unplug the cables from the CAN bus sockets
4. Disconnect the pluggable I/O terminals by pulling them out

To fasten a new *Smartpack2 Basic* controller to the power system, first configure its CAN ID address (read “CAN Bus Addressing”, page 12) and then, in the inverse order, carry out the opposite as described above: 1. Connect the I/O terminals, 2. Plug the CAN bus cables, 3. Engage the controller in the fixing tab (B) and 4. Tighten the screw (D).

DIN rail mounting with dedicated plate is also possible.

Figure 4 SP2B controller’s location in a subassembly. (The pluggable terminals may be black or green)

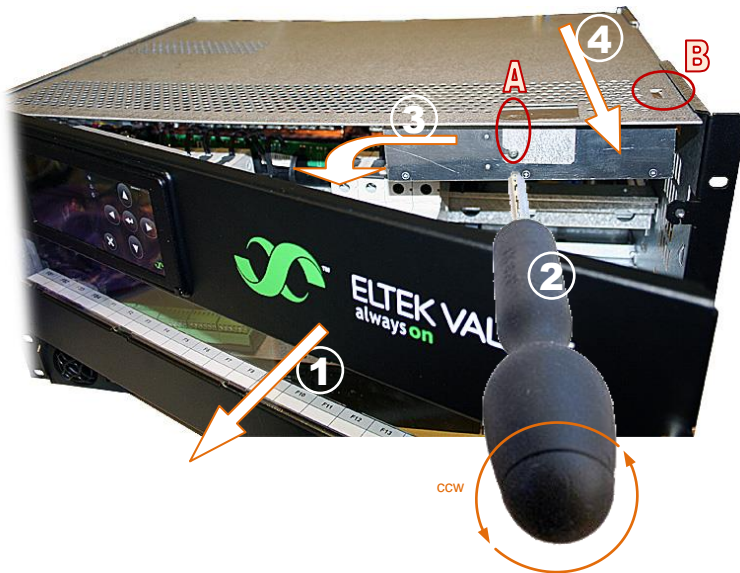
Fastening / Unfastening Top Cover-Mounted Controllers

To unfasten the *Smartpack2 Basic* controller from the top cover, switch OFF the system to make it completely voltage free (read “A” in “Endnotes”, page 15), and



CAUTION:

When the *Smartpack2 Basic* controller is mounted under the top cover, you must unfasten the controller (steps 1-3) before you can remove the top cover (step 4)



Power is OFF!

1. Open the power system's front panel
2. Loosen the fixing tab screw (A)
3. Slide the controller to the left — so that its tab disengage from the top cover's fixing tab (B) — and let the controller rest on the breakers
4. Slide the top cover towards the front and remove it (the CAN bus and I/O cables can now be disconnected)

Connection Drawing

Use this drawing as a connection reference for all cabling. You find the exact location of connection terminals, plugs and DIP switches, by referring to chapter “Location of Terminals, Ports, LEDs”, page 7.

The LVD control outputs may be configured for both latching and non-latching contactors via a standard web browser, using the controller’s web-based interface (CWUI). LVD Output 1 is usually configured as LVBD, and output 2 and 3 as LVLD1 and LVLD2.

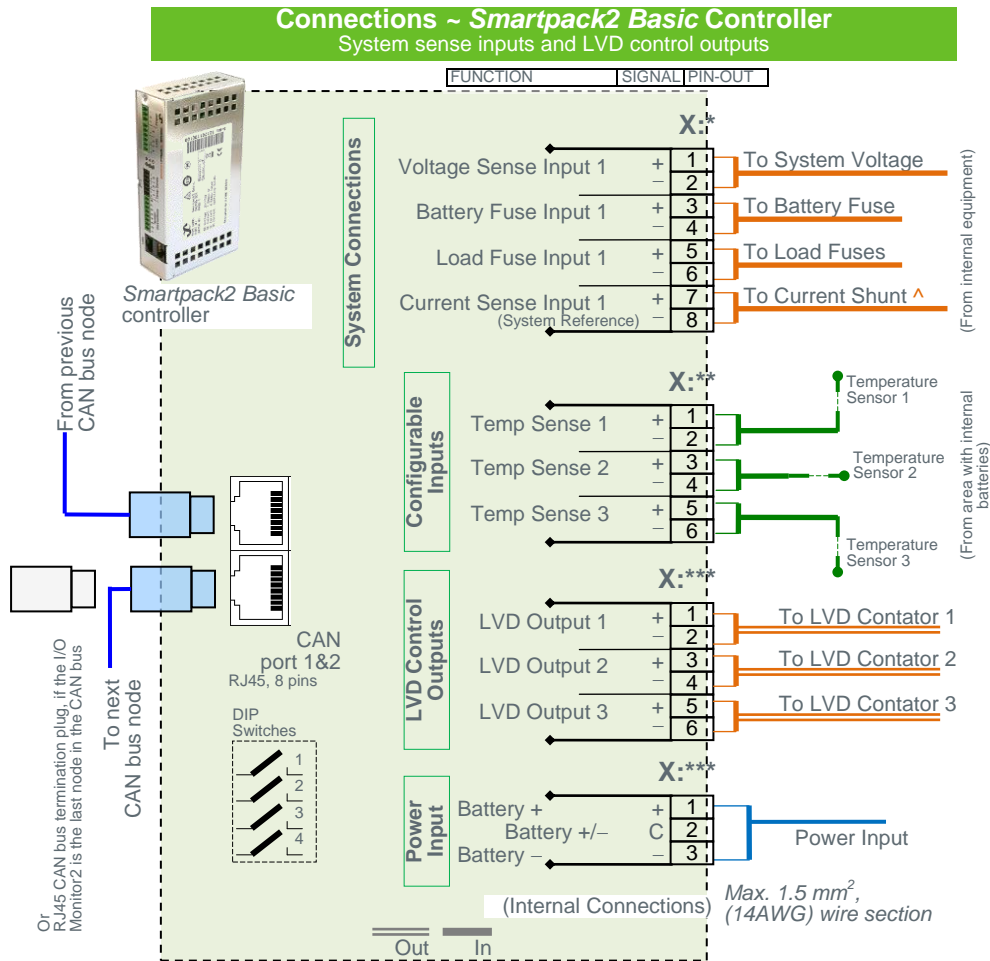


Figure 5 Connection Drawing Smartpack2 Basic controller

Read also chapter “Technical Specifications” page 15, for more details.

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).

Smartpack2-based DC 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.

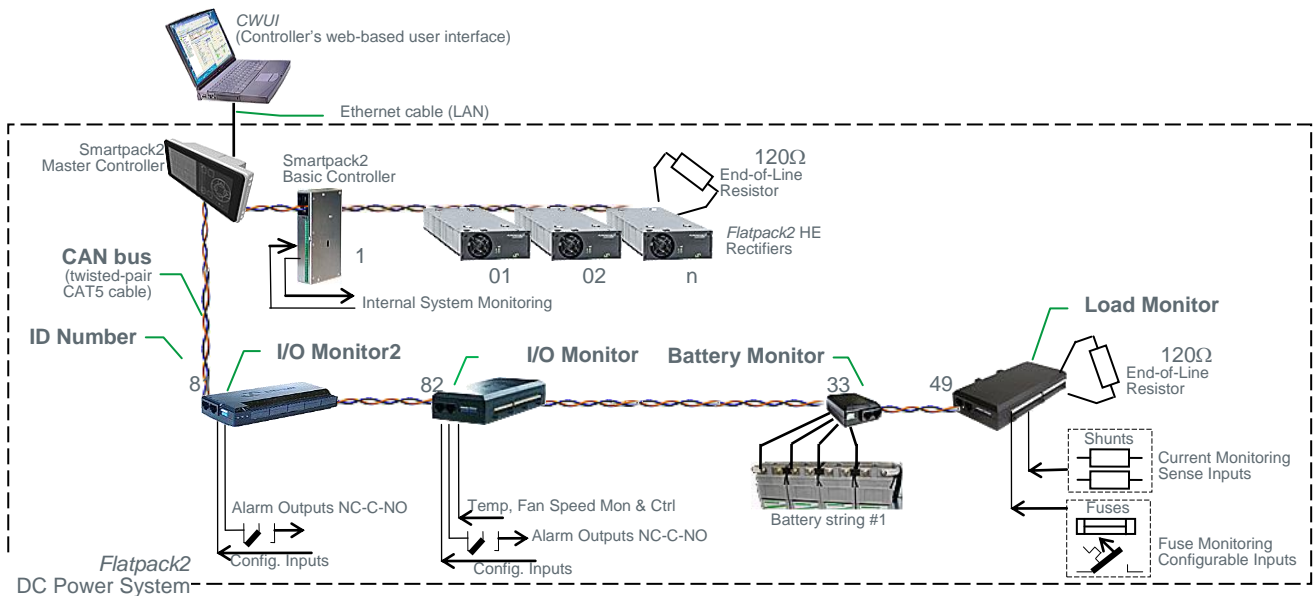


Figure 6 Example of CAN bus addressing and termination in a *Flatpack2* power system with *Smartpack2*-based control system and several monitors connected the CAN bus

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, *Smartpack2*-based power systems are shipped from factory with one or several *Smartpack2 Basic* controllers correctly installed and configured inside the power system.

CAN Bus Addressing

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

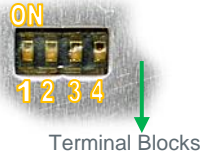
Other control units make use of DIP switches for configuring their unique CAN bus ID number (**hardware assignment**).

The *Smartpack2 Basic* controller's ID numbers (1, 2...8) are assigned by DIP switches on the controller's top.

A maximum of 8 *Smartpack2 Basic* controllers may be connected to the CAN bus.

Smartpack2 Basic 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

Smartpack2 Basic Controller**	ID #	DIP Switch Position 1 — 2 — 3 — 4
1 st Controller	1	OFF — OFF — OFF — OFF
2 nd Controller	2	ON — OFF — OFF — OFF
3 rd Controller	3	OFF — ON — OFF — OFF
4 th Controller	4	ON — ON — OFF — OFF
5 th Controller	5	OFF — OFF — ON — OFF
6 th Controller	6	ON — OFF — ON — OFF
7 th Controller	7	OFF — ON — ON — OFF
8 th Controller	8	ON — ON — ON — OFF

** The DIP switch positions apply also to
Smartpack controllers, but do not apply to
Smartpack2 Master controllers

Table 2 *Smartpack2 Basic* controller's DIP switch addressing

System Configuration

By the default, *Smartpack2 Basic* controllers are shipped from factory correctly configured inside the power system.

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

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

- **The controllers' front panel keypad**
using software menus and submenu options
- **A standard web browser**
to access the *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 organized in following *system-oriented logical groups* (displayed only when the hardware is connected and activated):

- Power System
- Mains
- Generator
- Rectifiers
- Battery
- Load
- Control System
- Solar
- Wind
- Converter

Also, these functions, characteristics and parameters are presented in following *task-oriented logical groups*:

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

For detailed functionality description, browse and search through the *Functionality Description* topic in the *PowerSuite* program's Help or in [Online Help](#).

Firmware Upgrade Controller

Upgrade of the *Smartpack2 Basic* controller's firmware is performed via the power system's CAN bus, while the system is live. Upgrading the firmware does not delete or change any of the configuration and calibration values stored in the *Smartpack2 Basic* controller.

You can upgrade the *Smartpack2 Basic* controller's firmware using one of the following two methods. Refer to Figure 7, page 14.

A. From the *Smartpack2 Master* controller's SD Card

- Insert in the *Smartpack2 Master* controller an SD card containing the *Smartpack2 Basic* controller's firmware source file <SP2BAS.MHX>.
- Use then the front keys on the master controller to download the firmware. Refer to the master controller's guide (350020.013) or to [Online Help](#)

For a detailed description, refer to the *Functionality Description* topic in the *PowerSuite* program's Help or in [Online Help](#).

NOTICE:

The files stored in the SD Card must have specific file names.

For example, if your firmware source file name is "SmartPack2_Basic_405007.009_V1.1.mhx", rename it to "SP2BAS.MHX" before copying it to the SD Card.



WARNING:

Uploading the firmware may take a long time, e.g. 35 minutes. Do not power down the system or controller during firmware upgrade, as it may corrupt the program memory and make the unit useless!

B. From a Personal Computer

You must connect a PC — via an USB-to-CAN Converter (art. 208565) — to one of the power system's CAN bus ends, and move the end-of-line resistor to one of the converter's CAN ports.

Run then the *FWLoader* program on the PC to download the firmware <SP2BAS_x.xx.MHX> or <SmartPack2_Basic_405007.009_Vx.x.mhx> to the *Smartpack2 Basic* controller.

You find a detailed description by browsing and searching through the *FWLoader* program's Help or in [Online Help](#).

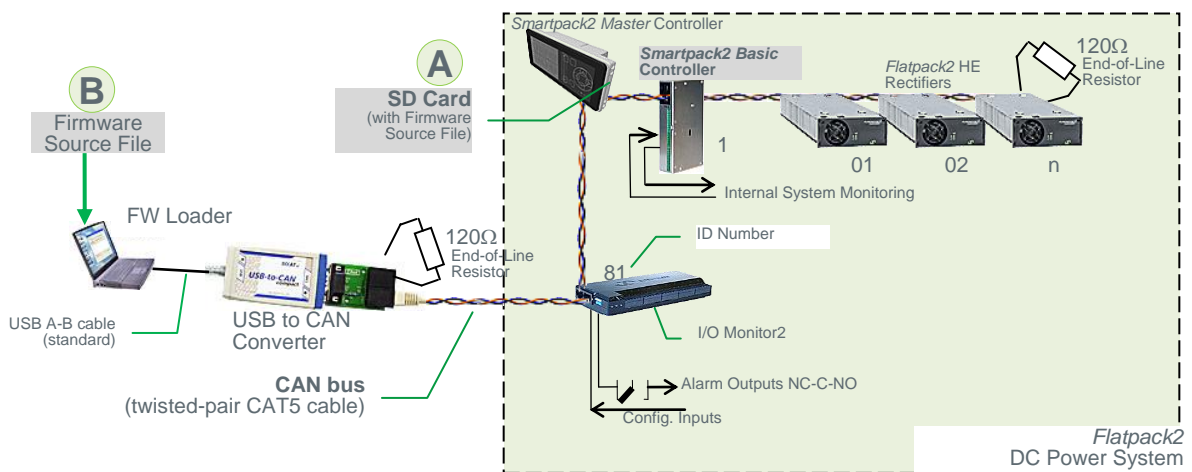


Figure 7 Example *Smartpack2 Basic* controller's firmware upgrade via SD card (A) or via PC (B)

Technical Specifications

Specifications – Basic	
Input Voltage	20-172 VDC (20 -75 VDC***) Shutdown: < 18 VDC
Power Consumption	Max 1.5A Max 4.5A (3x LVD max loaded)
Contactor Outputs	3 x LVD control outputs
Configurable Inputs	3x NO/NC/Temperature: NTC probe
System Connections	
o Voltage Sense	24V, 48V, 60V & 110V** systems
o Current Sense	0-20mV and 0-60mV range shunts
o Battery Fuse*	Battery fuse sense, Open/Closed
o Load Fuse*	Load fuse sense, Open/Closed, Pull-Up/Down, Diode Matrix
Ground fault	Simple bridge circuit detection
Max Basic nodes	8 units on a single CAN-bus
Dimensions (WxHxD)	155 x 35 x 80mm 6.4 x 1.4 x 3.3"

Specifications are subject to change without notice

242100.50X.DS3- v4

Ordering Information

Part no.	Description
242100.501	Smartpack2 Basic Controller
242100.500	Smartpack2 Master Controller
242100.502	I/O Monitor2 CAN node (type 2 G2)

Endnotes

- A. To **switch OFF the power system** (and make it completely voltage free):
- Switch OFF or remove all the load fuses, the battery fuses, the system's AC feed or supply fuses (may be located in external fuse boards) and any other power source. If the power system has no battery fuses, disconnect the battery cables.
 - Use a voltmeter to check that the system is completely voltage free.

Refer to **specific drawings** included with your system.



www.eltek.com

Headquarters:

Eltek

Gråterudv. 8, Pb 2340 Strømsø, 3003 Drammen, Norway
Phone: +47 32 20 32 00 Fax: +47 32 20 32 10