

Installation Guide

Flatpack2 Power System



Flatpack2 -48V 150A DC Power Systems

2029242 R2

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1. Safety and Compliance

WARNING: For safety, the power supply is required to be reliably connected to PROTECTIVE GROUND. The equipment is to be connected to supply mains by qualified personnel in accordance with local and national codes (e.g., NEC, CEC, etc). Do not disconnect and reconnect I/O power connectors during lightning storms. The output of the power supply is not intended to be accessible due to energy hazards. Rack mounting must be performed in accordance with instructions provided by the manufacturer to avoid potential hazards.

A readily accessible disconnect device shall be incorporated in the building installation wiring for all AC connections. Select wall breakers according to section AC input requirements (page 11).

FCC Compliance Statement

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment.

Protecting personnel against electrical shocks: The power system cabling must be done by qualified personnel in conformance with local and national electrical codes. Input voltages to rectifiers are at a dangerous level. Ensure that circuit breakers are locked in the OFF position at the AC service panel before attempting to work on the power system. Dangerous voltages may still be present at the terminals even if the rectifiers are OFF. Use a voltmeter to verify the presence of such voltages. Do not switch circuit breakers to ON until the entire system has been assembled and you have been instructed to do so according to the appropriate procedure. Improper wiring can cause bodily harm and equipment damage. Turn off all power sources before servicing units.

WARNUNG:

Schuetzen von Personal gegen elektrische Schocks. Die Spannungsversorgungs - Leitungen darf nur durch qualifiziertes Personal in Anpassung mit Oertlichen und nationalen elektrischen Codes ausgefuehrt werden. Unsachgemaesse Verdrahtung kann koerperliche Verletzung und Schaeden verursachen. Eingangsspannungen von der Netzspannungs - Versorgung Ihrer Hausanlage koennen unter Spannung stehen beim Anschluss der Leitungen. Versorgungsspannungen koennen bei unsachgemaessen Gebrauch gefaehrliche Schaeden verursachen. Sorgen Sie dafür,

dass die Cirquite Breaker in der aus position sind. Benutzen Sie ein Spannungsmesser um sicher zu sein das keine Netzspannung mehr vorhanden ist. Vergewissern Sie sich das alle Schalter an Ihrem Gereat und in der Vesorgung beim Anschluss abgeschaltet sind. Unsachgemaesse Verdrahtung kann koerperliche Verletzung und an der Ausstattung Schaeden verursachen. Vor Wartungsarbeiten am Gerät sind alle Netzkabel vom Stromnetz zu trennen, um die Gefahr eines elektrischen Schlages oder andere mögliche Gefahren zu reduzieren.

2. Introduction

The *Flatpack2* power core consists of a 1U control and distribution panel and a 1U rectifier shelf. Systems using the *Flatpack2* -48V 150A design are ideal for sites with minimum available floor space. The compact size of this system allows more space for additional telecom equipment even within the same rack. This system is mounted in a standard 19" or 23" telecommunications equipment rack. The standard system configuration accommodates up to four (4) -48VDC *Flatpack2* and *Flatpack2 HE* rectifiers, providing a total power output of 8kW.

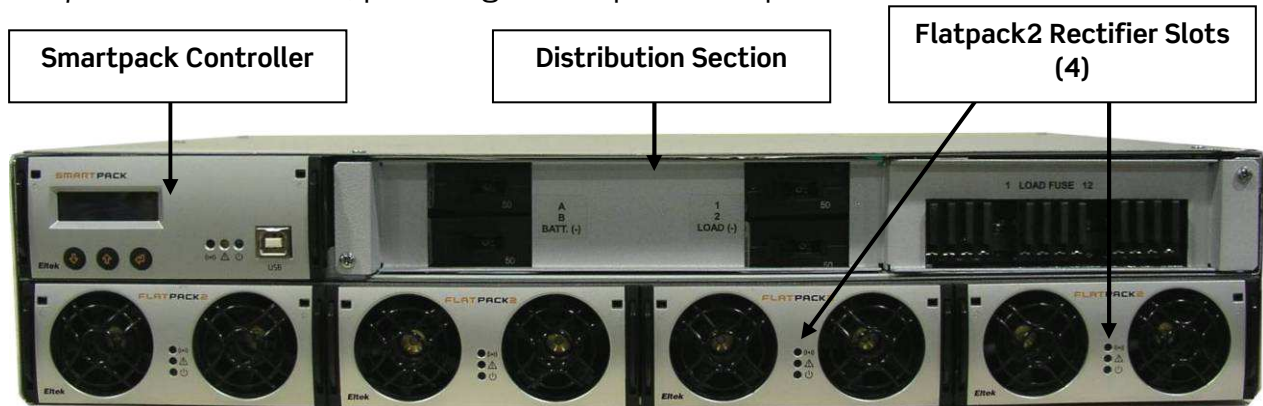


Figure 1 - *Flatpack2* -48V 150A System (2B 2L GMT shown)

About This Guide

This manual provides a comprehensive overview of and installation guidelines for the *Flatpack2* -48V 150A power system. Additional information regarding system components may be found in the following documents:

- o 350002.013: User's Guide—*Flatpack2* Rectifiers
- o 350003.013: User's Guide—*Smartpack* Monitoring & Control Unit

About This Revision (2)

A new document format was adopted for this revision to reflect the transition to the *Eltek Valere* brand. In addition, information from the *Flatpack2* -48V 150A Technical Bulletin (2033953) was incorporated into this manual.

3. Mechanical Installation



USE OF FULLY INSULATED TOOLS IS REQUIRED WHEN WORKING WITH ANY POWERED AC OR DC CIRCUITS.



THE SYSTEM IS TO BE MOUNTED OVER A CONCRETE SURFACE ONLY AND INSTALLED IN RESTRICTED ACCESS LOCATIONS (RAL). ACCESS MUST BE LIMITED BY USE OF TOOL, I.E. LOCK AND KEY.

The following tools are required for the installation:

- Standard wrench and/or socket set (1/4" to 1")
- Torque wrench, 10-40 Ft-lb range.
- Torque screwdriver, 5-10 in-lb range.
- Small flat blade screwdriver (3/32" wide)
- Standard blade screwdriver and Phillips tip screwdriver
- Wire cutters / strippers
- Fork-lift truck or similar heavy equipment handling transport
- Hoist with lifting straps
- Electric drill and appropriate bits (a hammer drill may be required for concrete flooring)

System Unpacking

An individual *Flatpack2 -48V 150A* unit is shipped in a box with protective packing material. If pre-installed in a cabinet or rack, the assembly is wrapped with a shroud of high-strength plastic and bolted to a wooden pallet with four anchors. Rectifier modules and expansion options are packed in separate cartons.

Exercise care when unpacking and setting the equipment in place.

Rack Mounting

The *Flatpack2 -48V 150A* system can be installed in a rack or an enclosure. The mounting brackets are pre-installed at the factory and designed to be mounted within a standard EIA 19" or 23" rack. Systems are designed to be mid-mounted. Other mounting configurations may require additional support brackets.

Rack Installation

- 1) Use proper lifting equipment to position the *Flatpack2 -48V 150A* system so that the holes in the support bracket are aligned with the correct mounting holes in the rack.
- 2) Use rack screws to connect the system brackets to the desired positions of the rack.

Anchor the Cabinet

If the system is delivered installed in a mounting rack, anchor the cabinet before installing rectifiers and batteries. Refer to the accompanying system installation guide for rack feet diagrams and floor loading concerns.

Equipment Rack “Frame Ground”

Connections are located at rear of the rectifier rack with chassis studs provided in the AC input chamber. Refer to the NEC and any local codes practices to determine the appropriate wire size. Use of paint-penetrating washers, abrasive compounds, or other means to achieve a reliable frame ground is recommended.

Converter Shelf Installation

If *Flatpack* DC-DC converters are to be installed, refer to the manual accompanying the converters for instructions on mounting and making system connections.

4. Electrical Installation



CAUTION: VERIFY THAT ALL AC CIRCUIT BREAKERS FEEDING THE SYSTEM ARE IN THE OFF POSITION. KEEP ALL AC BREAKERS OFF UNTIL ALL APPROPRIATE SYSTEM CONNECTIONS HAVE BEEN MADE AND VERIFIED. REFER TO SECTION 9 FOR STARTUP CHECKLISTS.



WARNING: FOR SAFETY REASONS (HIGH LEAKAGE CURRENT AND HIGH TOUCH CURRENT) ALWAYS CONNECT THE AC EARTH WIRE (PE) TO THE TERMINALS BEFORE CONNECTING AC INPUT CABLE(S).

Flatpack2 rectifiers have an input voltage range of 85 to 300 VAC (Nominal 185 – 275 VAC), with a frequency range between 45 and 66Hz. See the *User's Guide—Flatpack2 Rectifier Modules* (350002.013) for further details.



The AC junction box of each rectifier shelf contains a knockout hole for a standard trade-size conduit with a diameter of 0.75".

To wire the AC input terminal block:

- 1) Remove the cover located at the rear of each rectifier shelf using a Phillips screwdriver (two screws).
- 2) Unscrew and remove the green AC connector using a Phillips or flat blade screwdriver.
- 3) Use a small flat blade screwdriver to open each terminal and install AC wiring. See the sections "Individual Feed" on page 11 and "Dual Feed" on page 11 for wiring details.
- 4) Pull a green safety wire in the AC mains conduit and terminate it to the ground terminal of the connector. It should be longer in length than the black and white AC wires.
- 5) Double-check that each connection is secure and replace the connector.

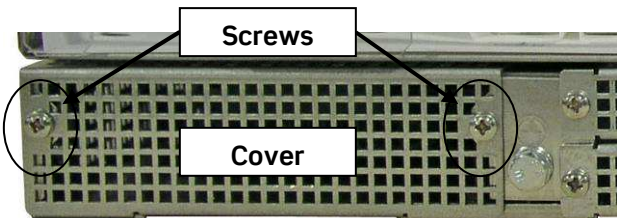


Figure 2 - AC Input Cover



Figure 3 - AC Terminal Block (Removed)

- 6) If necessary, terminate additional safety wires to the shelf ground termination stud located to the right of the connector (see Figure 4 and Figure 5).
- 7) Replace the cover after AC terminations are complete. Make sure to line up the bottom plate between the guides on the bottom of the shelf.

Individual Feed

An individual feed shelf is fed by four (4) AC feeds; each feed supplies one rectifier and should have 15A breakers. The figure below illustrates the 9-pin AC input connector. Termination points for Line 1, Line 2, and Ground are listed in the table at right. #12 AWG wire is recommended for each 15A circuit, but up to #10 AWG may be used for each feed termination position.

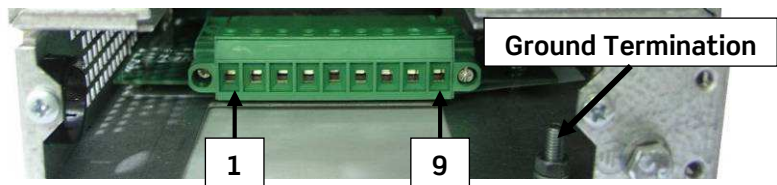


Figure 4 - Individual Feed Connector (Cover Removed)

Pin	Description
1	Line 1, Rectifier 1
2	Line 2, Rectifier 1
3	Line 1, Rectifier 2
4	Line 2, Rectifier 2
5	Line 1, Rectifier 3
6	Line 2, Rectifier 3
7	Line 1, Rectifier 4
8	Line 2, Rectifier 4
9	Ground

Dual Feed

A dual feed shelf is fed by two (2) AC feeds; each feed supplies two rectifiers and should have 30A breakers. The figure below illustrates the 5-pin AC input connector. Termination points for Line 1, Line 2, and Ground are listed in the table at right. #10 AWG wire is recommended for each 30A circuit.

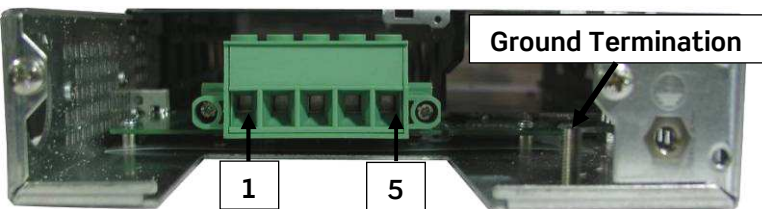


Figure 5 - Dual Feed Connector (Cover Removed)

Pin	Description
1	Line 2, Rectifier 1 & 2
2	Line 2, Rectifier 3 & 4
3	Line 1, Rectifier 1 & 2
4	Line 1, Rectifier 3 & 4
5	Ground

5. Module Installation



CAUTION:

- Do **not** carry modules by the handles, even if they are warm
- Open the handles **before** inserting modules into shelves



Flatpack2 rectifiers incorporate an AC mains fuse in each line.
Double Pole / Neutral Fusing

Both the *Smartpack* controller and the *Flatpack2* rectifier utilize the same locking mechanism to keep the module fixed in place when installed into a system shelf. Typically, the *Smartpack* controller is delivered installed in the system. If it is not pre-installed, make required connection to the back of the controller before installing (see Section 7).

To install modules:

- 1) Release the handles by inserting a small flat-blade screwdriver into the release slots and pressing the tip upward; extend each handle.
- 2) Slide the module firmly into the shelf.
- 3) Latch the handles to lock the rectifier in place.



To remove modules:

- 1) Release the handles by inserting a small flat-blade screwdriver into the release slots and pressing up.
- 2) Use the handles to pull the module out just far enough to where the body can be held.
- 3) Slide the module out the rest of the way. Do not carry it by the handles. *Flatpack2* rectifiers weigh just over 4 lbs (1.9 kg) each.

6. Distribution

The *Flatpack2* -48V 150A system consists of a 1U section for the controller and distribution. When looking at the front, the *Smartpack* controller occupies the leftmost position corresponding to the width of one *Flatpack2* rectifier slot in the power shelf below. When viewed from the rear of the system, the controller slot occupies the rightmost position; the controller alarm board is accessible from this side.

All termination points are located in the rear of the system and are stacked vertically in pairs. For battery landings, the top cable landing is labeled “A” and is set back to give clearance to the bottom landing, which is labeled “B”; these landings are labeled “1” and “2”, respectively, for load landings.

To make cable connections:

- 1) Remove the two screws securing the cover using a Phillips screwdriver.
- 2) Make careful note of the labels for each landing before making connections. Do **not** connect batteries until system turn-up.
- 3) Make connections with a maximum #1 AWG cable with two-hole lugs having 1/4” diameter holes on 5/8” centers; 1/4-20 fastening hardware is provided.
- 4) Torque connections to 51-58 in-lbs.

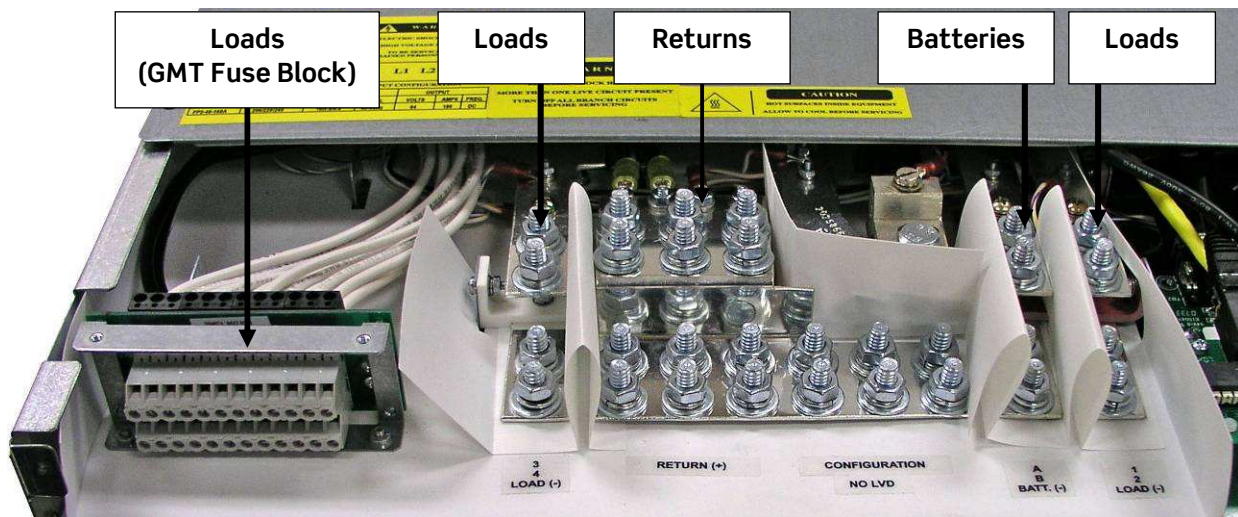


Figure 6 - Rear Distribution Connections (4L GMT shown)

Systems configured to accept GMT fuses have a 12-position GMT fuse block installed in the leftmost distribution position (far right when viewed from the front). The block is rated at a total of 65A, with each position accepting up to a 15A fuse. The positions are numbered 1 to 12 from *right to left* (see Figure 7). The top row is the “hot” or “output” terminal; the bottom row is for returns. These terminals accept wire sized from #22 AWG to #14 AWG.

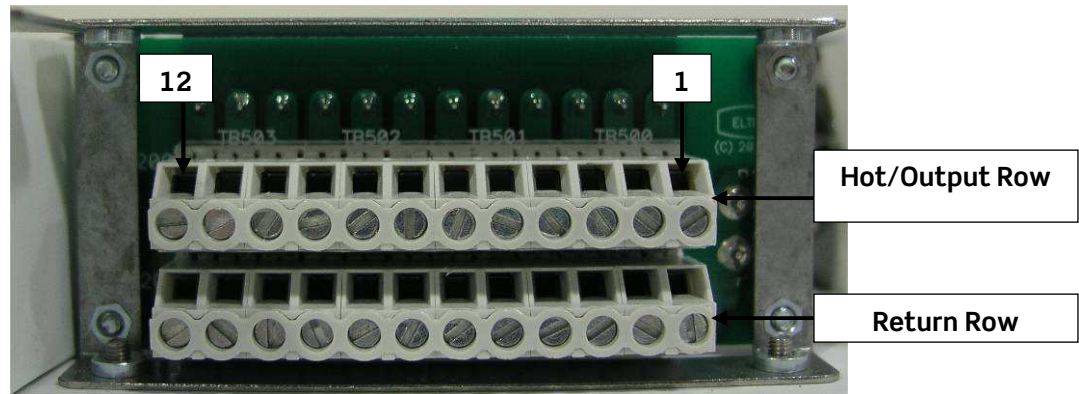


Figure 7 - GMT Block Distribution Terminals

To wire the GMT fuse block:

- 1) Remove the two screws securing the cover using a Phillips screwdriver.
- 2) Use a small flat blade screwdriver to open the desired terminals (the clamp screw is below each terminal).
- 3) Strip load wire 3/8" and insert it into the top terminal.
- 4) Tighten the screw to secure the wire.
- 5) Strip the return wire 3/8" and insert it into the bottom terminal.
- 6) Tighten the screw to secure the wire.
- 7) Repeat for each remaining GMT position

LVD Options

A single low-voltage disconnect (LVD) contactor can be installed for either battery or load equipment. The "Configuration" label (in front of the return bus to the right of the "RETURN" label) describes which of the three LVD configuration options the distribution section contains: LVBD (battery disconnect), LVLD (load disconnect), or NO LVD.



Central Office Ground

A dedicated central office (CO) grounding conductor connection is recommended. This conductor should be of the same or larger gauge than the largest system conductor. It should be able to discharge total system current in a fault condition. A THHN style cable is recommended. This cable should be installed between the DC system point (as shown) and the primary site ground bar. See Figure 8 for the recommended organization of return connections.



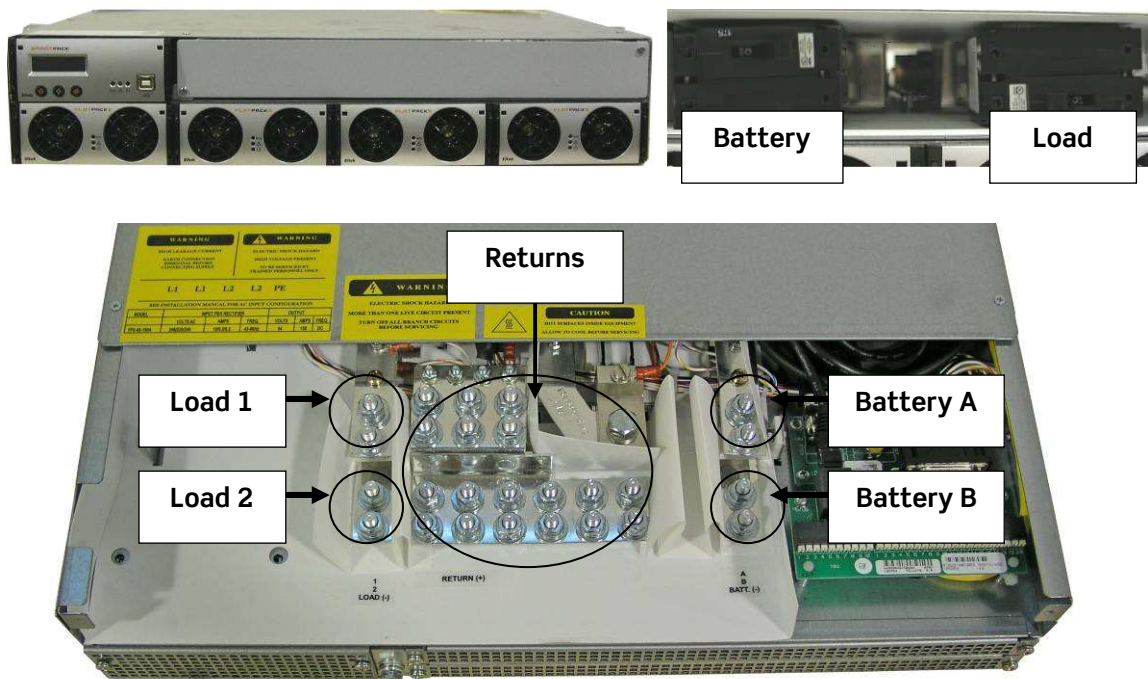
Figure 8 - Recommended Return Bus Organization

Configurations

Configurations for the *Flatpack2* -48V 150A system are defined by the number of breaker positions provided for batteries and load equipment. The following are common configurations:

Two Battery, Two Load (2B 2L)

The two leftmost breaker position sets are populated, and the rightmost bus set is not installed in the “2B 2L” configuration.



Two Battery, Two Load, 12 GMT (2B 2L GMT)

This configuration comes with two battery breaker positions, two load positions, and a 12-position GMT fuse block in the rightmost section.

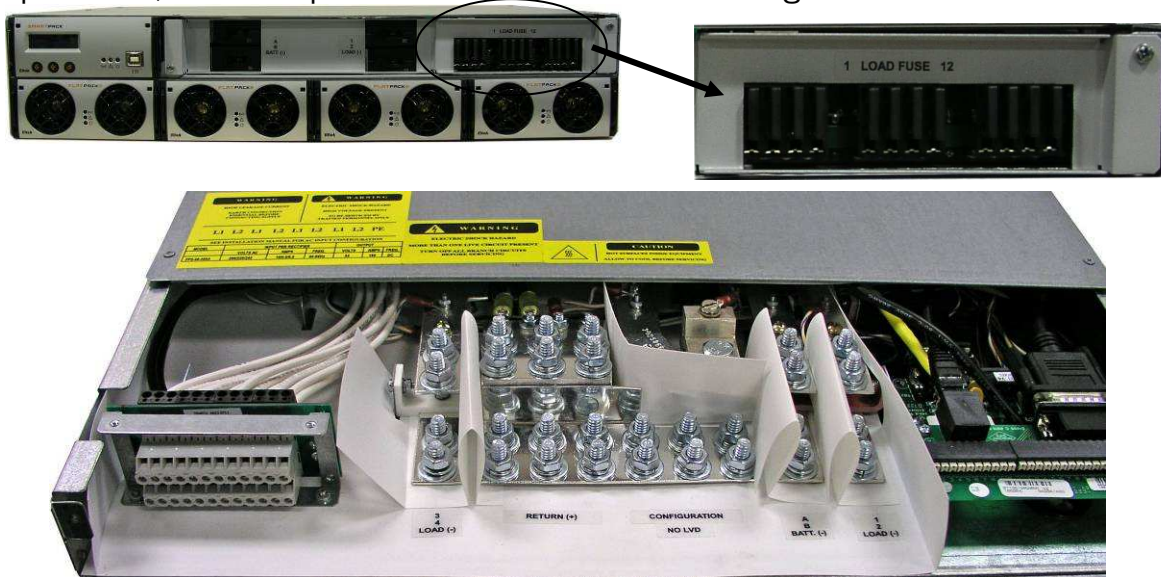
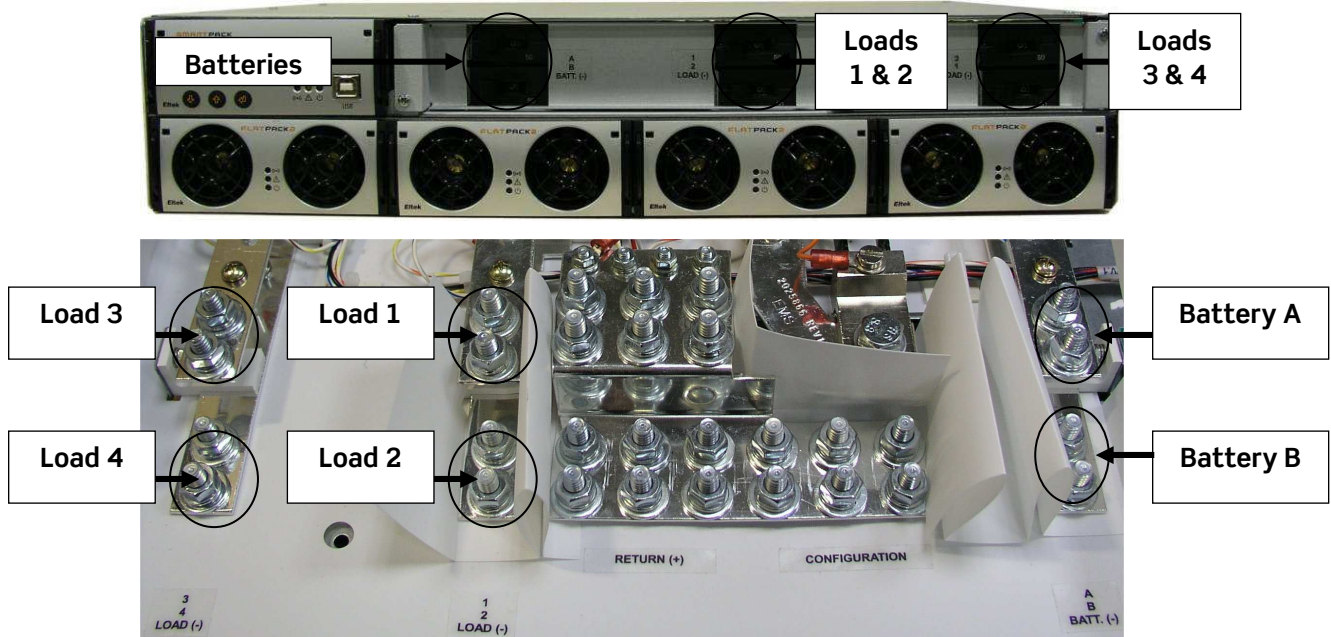


Figure 9 - Connections to GMT Block (Rear View)

Two Battery, Four Load (2B 4L)

The “2B 4L” configuration populates all six plug-in positions. As usual, the leftmost positions are dedicated to batteries; the rest are for load output.



NOTE: Battery breakers turn ON to the *left*; load breakers turn ON to the *right*.



CAUTION: THE FOLLOWING CONFIGURATIONS FEATURE UNPROTECTED BATTERY TERMINALS. IT IS STRONGLY RECOMMENDED THAT EXTERNAL BREAKERS OR FUSES BE INSTALLED BETWEEN THE SYSTEM AND BATTERIES.

NOTE: When facing the front of the system, the leftmost load breakers in the following distributions turn ON to the *left*; the rest turn ON to the *right*.

Four Load, 12 GMT (4L GMT)

The “4L GMT” configuration changes the two 100A battery breaker positions into 60A load positions by tying them to the internal load bus. Two bulk, unprotected battery landings are available in the rear of the system (see Figure 10). The rightmost position is populated by a GMT fuse block.

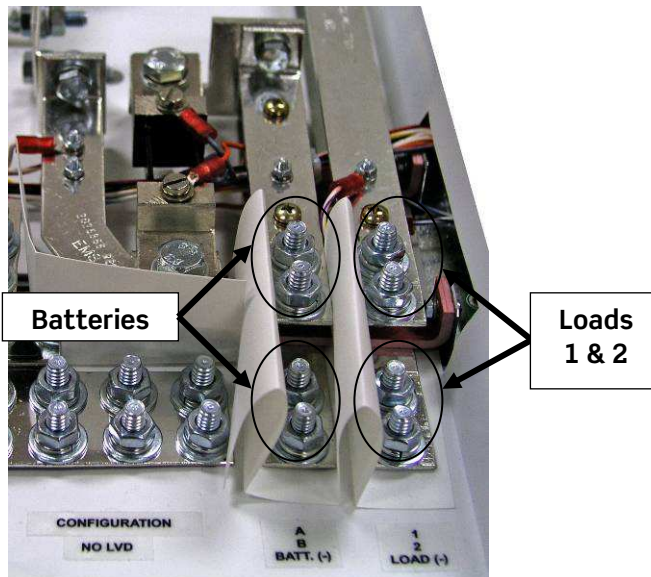


Figure 10 - Bulk Battery and Protected Load Landings

Six Load (6L)

This configuration differs from the “4L GMT” system only in that, rather than a GMT fuse block, the rightmost position is populated by a set of parallel load buses.

Breakers and Fuses



CAUTION: SIGNIFICANT EXTRACTION FORCE IS REQUIRED TO REMOVE DISTRIBUTION DEVICES DUE TO THE CONTACT PRESSURE REQUIRED FOR HIGHLY RELIABLE, LOW-TEMPERATURE RISE CONNECTIONS.

Up to six distribution busses, arranged into three sets of two, can be configured to receive plug-in breakers or plug-in fuse holders from the front of the *Flatpack2* -48V 150A system. Plug-in positions are likewise grouped into a maximum of three sets of two positions, with each set stacked vertically and oriented horizontally.

Do not use any type of clamps, pliers, or other hard tools to remove distribution devices as the housing may be cracked by excessive force. Damaged distribution device represent an operational hazard and should never be used.

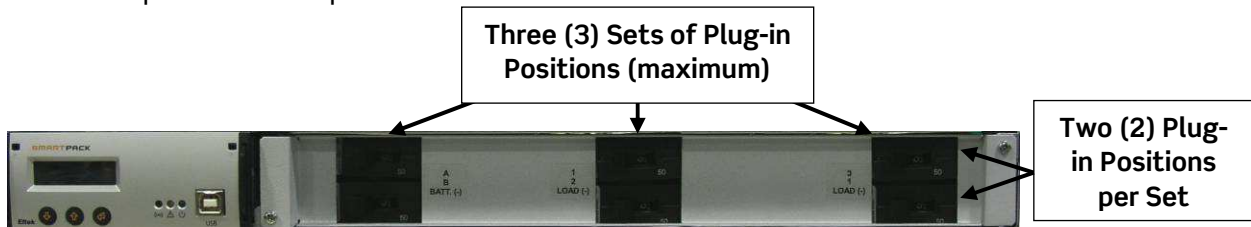


Figure 11 - Plug-in Disconnect Device Positions (2B 4L shown)

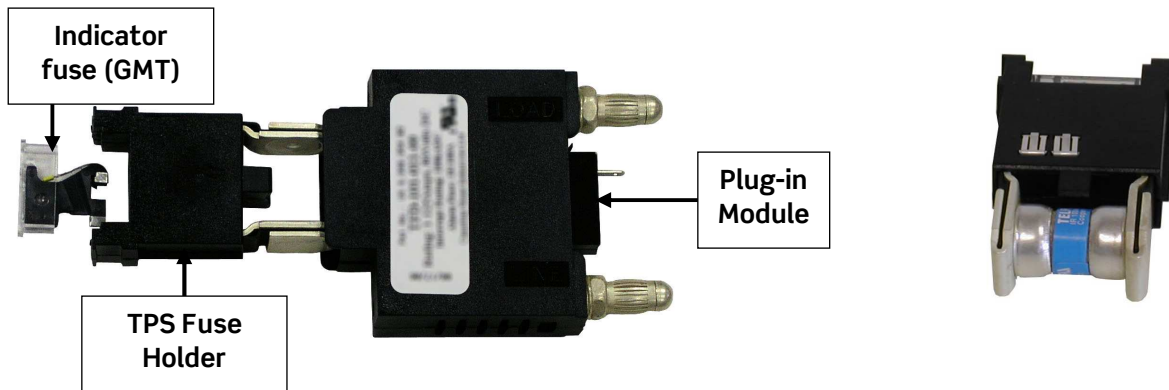
Plug-in Breakers

Auxiliary contact circuit breakers are standard over-protection devices used this distribution. All breakers are connected to system alarming so that an open breaker (whether tripped or manually placed in the OFF position) triggers a “Load Distribution Alarm” in the *Smartpack* controller. Breakers should be removed from any unused positions to prevent nuisance alarms. Single-pole circuit breakers rated up to 100A can be installed. Each set of positions also accepts a two-pole breaker rated up to 175A.

Plug-in Fuse Holders

As an alternative to plug-in circuit breakers, plug-in fuse modules may be installed. The same considerations regarding insertion and removal of breakers should be observed.

A plug-in fuse assembly consists of three main parts: A fuse, an alarm fuse indicator, and a plug-in module. If the main fuse element opens, the alarming fuse also opens, giving a visible indication of a fault condition; a signal is then sent via the *Smartpack* alarm board that activates the remote system monitor. The alarming fuse must be replaced whenever a new main fuse is required. A fuse holder may be removed and inserted into the plug-in module at any time; it is not necessary to remove the plug-in module to replace the fuse.



NOTE: If breakers or fuse-holders are not installed in the correct orientation, the alarm may not signal properly when a device opens.

To install plug-in breakers or fuse-holders for LOAD:

- 1) Remove the two screws holding the front cover in place using a Phillips screwdriver.
- 2) Orient the “LINE” and “LOAD” bullets to the correct bus. The leftmost breaker set (next to the *Smartpack* controller) has LINE to the right and LOAD to the left; the actuator turns ON to the *left*. The other positions have LINE to the left and LOAD to the right; the actuator turns ON to the *right*.

To install plug-in breakers or fuse-holders for BATTERY (if used):

- 1) Connect the battery alarm wire to the device’s normally closed (NC) alarm pin.
- 2) Orient the “LINE” and “LOAD” bullets to the correct bus. The battery breaker set (next to the *Smartpack* controller) has LINE bus to the right and its LOAD bus to the left; the actuator turns ON to the *left*. Securely insert device into the receptacles.
- 3) Remove fuses and turn breaker actuators OFF until system turn-up.

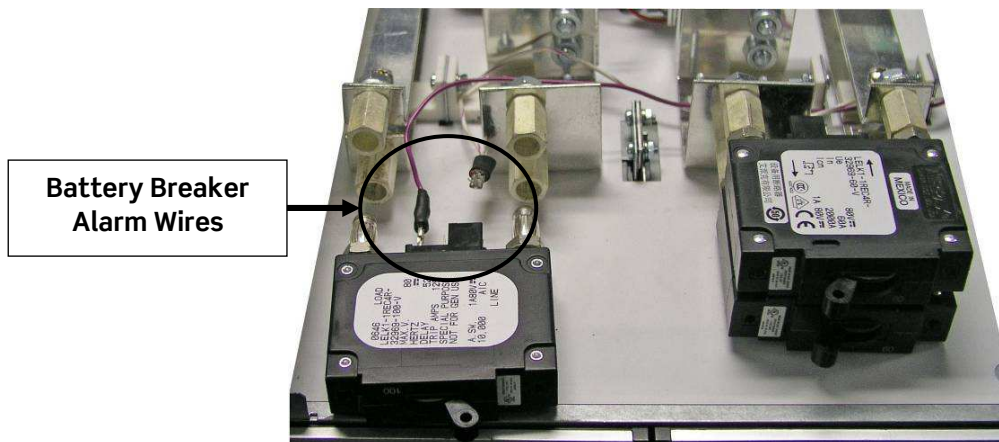


Figure 12 - Proper Battery Breaker Orientation and Alarm Connection

GMT Fuses



Twelve (12) GMT fuse positions are provided in a standard block, which is rated for a maximum of 65A (total). GMT fuses rated from 1/8A to 15A can be used in each position. Open fuses are easily identified by the graduated movement of the metal fuse tab. The tab moves in a manner that exposes the colored tip to indicate a failed circuit. If installed, the GMT fuse block populates the rightmost disconnect device position.

From the front, the fuse positions are numbered 1 to 12 from *left to right*. Naturally, the numbering is reversed when viewed from the back.



Battery Connections



CAUTION: DO NOT CONNECT BATTERIES UNTIL SYSTEM TURN-UP. FOLLOW THE CHECKLIST PROVIDED FOR THE PROPER PROCEDURE.

Every distribution configuration of the *Flatpack2 -48V 150A* system features two battery termination points. When viewed from the rear, the battery bus landings take up the one of the rightmost positions of the distribution section, just to the left of the *Smartpack* alarm board. A label reading “BATT (-)” appears directly in front of the landings.

There are two possible configurations for battery connections: With breaker positions or without breaker positions.

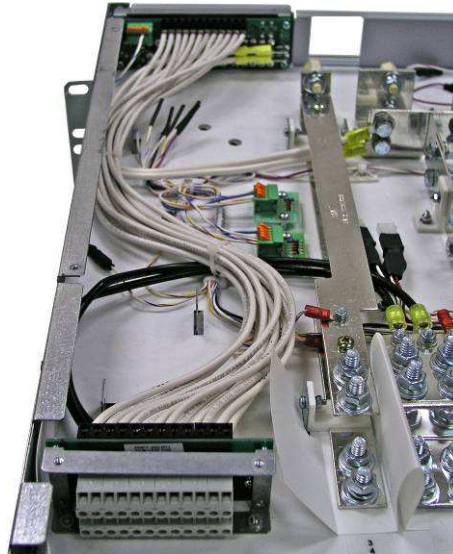
If breaker positions are utilized, the battery busses take up the rightmost position when the system is viewed from the rear. The corresponding breaker positions are located to the right of the *Smartpack* controller at front (leftmost position when facing the front of the system).

NOTE: Battery breakers turn ON to the *left* and OFF to the *right*.

If there are no breakers installed, the battery busses take up the position just to the left of the bus with breaker positions and to the immediate right of the return bus. In this case, the rightmost busses may be used for load output. In every case, make sure to check the labels before connecting batteries to the system.

Load Connections

DC load output in the *Flatpack2* -48V 150A system features a variety of configurations. If configured for load output, the system can have two, four, or six load busses. The two parallel buses farthest to the left (when viewed from the rear of the system) can be substituted for a 12-position, 65A GMT fuse block.



7. Alarm and Control Terminations

Alarm Contacts

The alarm interface board is located at the rear of the system in the distribution section, directly behind the *Smartpack* controller. Alarm outputs are “Form-C” contacts. There are an equal number of alarm inputs and outputs provided.



TB2										TB1									
1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Conf. input 1B +	Conf. input 1A -	Conf. input 2B +	Conf. input 2A -	Relay 1 OTA	Relay 1 COM	Relay 1 CTA	Relay 2 CTA	Relay 2 COM	Relay 2 CTA	Conf. input 3B +	Conf. input 3A -	Conf. input 4B +	Conf. input 4A -	Conf. input 5B +	Conf. input 5A -	Conf. input 6B +	Conf. input 6A -	Relay 3 OTA	Relay 3 COM
																		Relay 3 CTA	Relay 4 CTA
																		Relay 4 COM	Relay 4 CTA
																		Relay 5 CTA	Relay 5 COM
																		Relay 5 CTA	Relay 6 CTA
																		Relay 6 CTA	Relay 6 COM

CTA=CLOSE TO ALARM OTA=OPEN TO ALARM

Relay	Description
1	Common Alarm
2	AC Main Alarm
3	Distribution Alarm
4	High Voltage Alarm
5	Low Voltage Alarm
6	Rectifier Fail Alarm

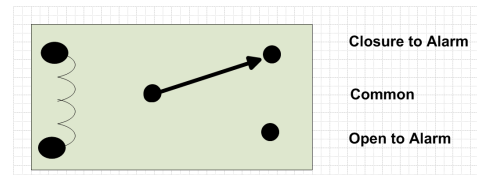
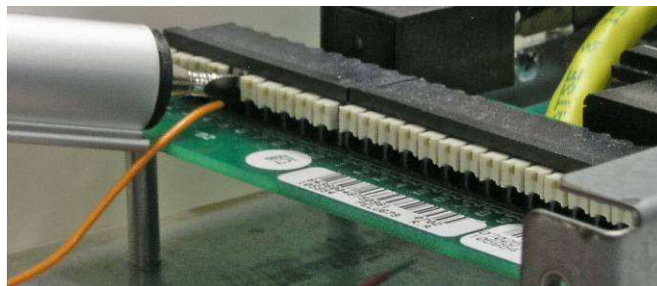


Figure 13 - Alarm Board Terminals

To install an alarm wire to the board:

- 1) Strip the alarm wire end 3/8".
- 2) Press the white terminal clamp above the desired wire location.
- 3) Insert the alarm wire, and release the terminal clamp.

The alarm connector is designed to accept a wire range of #26 AWG solid or stranded to #18 AWG. The Form-C contacts provided in the system have a rating of 1A at 60 VDC. Please refer to the *User's Guide—Smartpack Monitoring & Ctrl Unit* for further details of alarm relay designations and assignment procedures.



Configurable Inputs

The configurable alarm inputs of the *Smartpack* alarm board can be used to connect external site alarms or input devices such as door sensors, fire alarms, and generator activation alarms. Each relay circuit can be set to “normally-closed” on either the menu or the *Power* auxiliary system components and DC-DC converter alarms.

TB2										TB1																			
1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Conf.input 1B +	Conf.input 1A -	Conf.input 2B +	Conf.input 2A -	Relay 1 OTA	Relay 1 COM	Relay 1 CTA	Relay 2 OTA	Relay 2 COM	Relay 2 CTA	Conf.input 3B +	Conf.input 3A -	Conf.input 4B +	Conf.input 4A -	Conf.input 5B +	Conf.input 5A -	Conf.input 6B +	Conf.input 6A -	Relay 3 OTA	Relay 3 COM	Relay 3 CTA	Relay 4 OTA	Relay 4 COM	Relay 4 CTA	Relay 5 OTA	Relay 5 COM	Relay 5 CTA	Relay 6 OTA	Relay 6 COM	Relay 6 CTA
CTA-CLOSE TO ALARM										OTA-OPEN TO ALARM																			

Figure 14 - Input Terminals

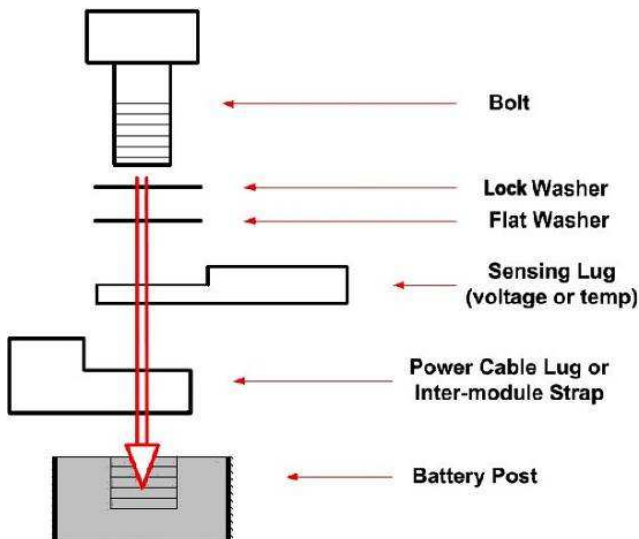
be set to “normally-closed” or “normally-open”. This can be selected through either the menu or the *PowerSuite* interface. Some inputs can be used by auxiliary system components like external or tray-mounted battery disconnects and DC-DC converter alarms. Use solid or stranded wire of size 28-16 AWG.

Temperature Probe Terminations

The standard *Smartpack* controller is capable of temperature-compensated battery charging, symmetry monitoring, and advanced battery discharge monitoring. Temperature probes can be provided alone or integrated into the symmetry monitoring cables.

Rear access to the system controller is required in order to connect a single temperature probe. Unlock the *Smartpack* controller using the same process used for the rectifiers (see page 12). Feed the cable through the system as desired through the wiring ports.

The 15-pin serial connector (DE15) of the temperature probe connects to either **CON3** or **CON4** on the rear of the *Smartpack* controller.



The probe end is designed to be installed directly at the battery post. The best termination point may vary depending on the type of battery being used. The probe itself is not polarity sensitive, so it can be installed at either a (-) or (+) battery post. The hardware configuration at left is recommended. This allows the probe to monitor the temperature accurately without interfering with the current-carrying terminations on the battery.

NOTE: IF USING EXTERNAL BATTERY CONNECTIONS BOARDS, SUCH AS THOSE PROVIDED WITH A SYMMETRY MONITORING KIT, DO NOT CONNECT MORE THAN ONE TEMPERATURE PROBE TO EACH OF THE BOARDS. CONNECT A SINGLE PROBE EITHER TO THE 15-PIN SERIAL PORT **CON6/CON7** OR TO THE SENSE INPUTS TO TERMINALS **9** AND **10** OF THE TERMINAL BLOCK.

Symmetry Terminations

Symmetry capability is facilitated by a symmetry monitoring kit. A battery connection board is mounted near the batteries using a bracket. The serial port connector (DE15) connects the board to either **CON3** or **CON4** on the rear of the *Smartpack* controller. Up to two battery boards may be installed for each controller. In this case, temperature probes must connect to the battery connection board (one per board). Battery symmetry harness connections will vary depending on the desired configuration. Refer to the symmetry kit manual (#251491.033) for more details and installation instructions.

8. Controller Access

Controller Configurations

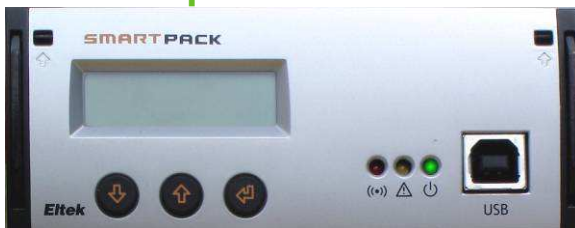
The *Flatpack2* power system can be delivered in several configurations. The following examples are basic configurations. The *Flatpack2* -48V 150A power system uses a single *Smartpack* controller.

Smartpack Extended



- Local user interface via a three-button keypad on the front panel
- 2 line x 16 character, high-contrast backlit LCD display
- Digital communication with each *Flatpack2* rectifier
- Storage of setup parameters, alarm configuration and system history in non-volatile memory
- Real time clock with battery backup
- Advanced battery monitoring and *full symmetry for 2 battery strings*
- Recording of rectifier serial numbers and other information
- Load-shedding control
- 6 digital inputs* for site equipment alarms
- 6 user defined* form C output contacts

Smartpack Web



- Local user interface via a three-button keypad on the front panel
- 2 line x 16 character, high-contrast backlit LCD display
- Digital communication with each *Flatpack2* rectifier – *TCP / IP or SNMP user interface*
- Storage of setup parameters, alarm configuration and system history in non-volatile memory
- Real time clock with battery backup
- Advanced battery monitoring and *full symmetry for 2 battery strings*
- Recording of rectifier serial numbers and other information
- Load-shedding control
- 2 digital inputs* for site equipment alarms
- 2 user defined* form C output contacts

Local Keypad Access

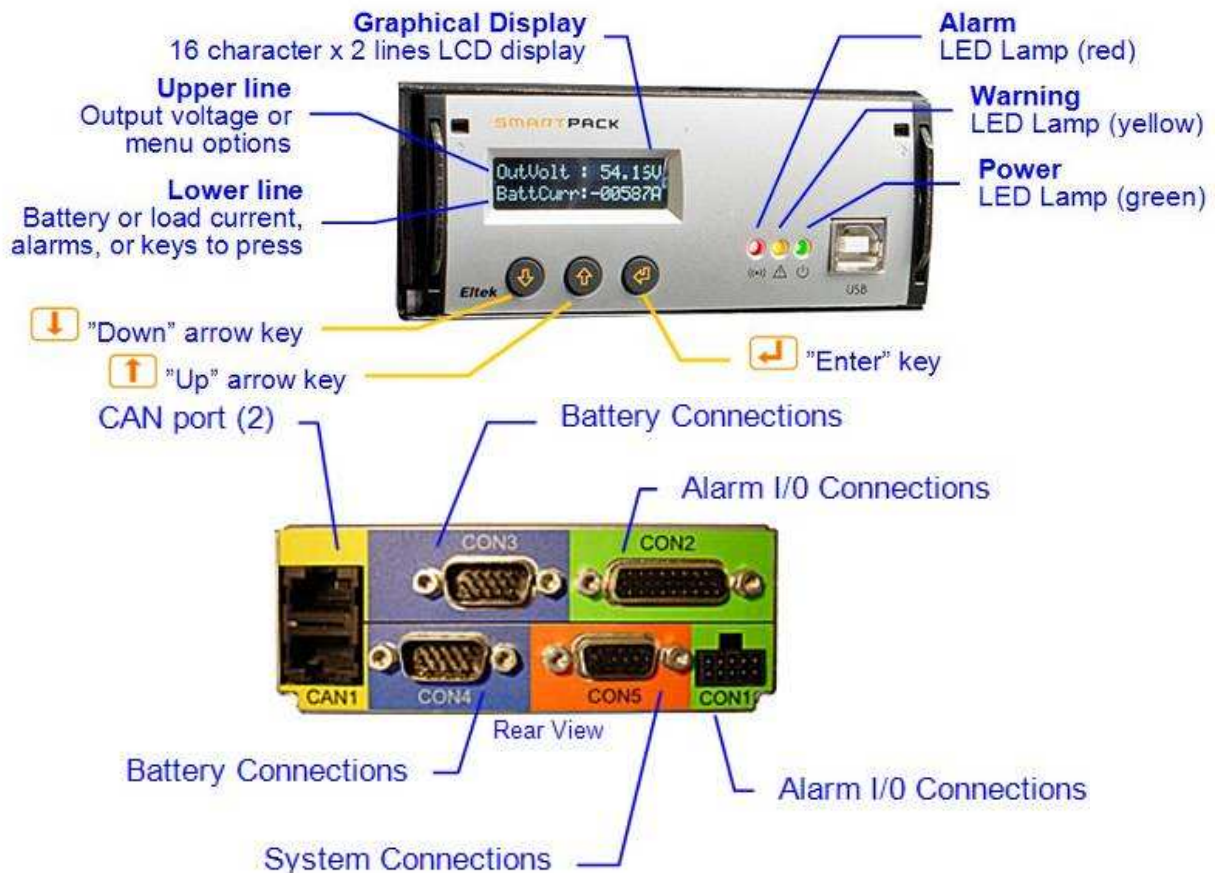
The *Smartpack* controller is typically pre-configured at the factory according to customer requirements. If operational adjustments are required refer to the *PowerSuite* Help menu or *Smartpack* manual for further details. The *Smartpack* digital controller is located in the distribution section and provides system control and monitoring functions. Features include:

- Local user interface via a three-button keypad on the front panel
- 2 line x 16 character, high-contrast backlit LCD display
- Digital Communication over CAN-bus with each Flatpack2 rectifier
- Storage of setup parameters, alarm configuration and system history in non-volatile memory
- Real time clock with battery backup
- Advanced battery monitoring and protection



Display Modes: *Status Mode* (displays the system's status) or *Menu Mode* (displays the menu structure).

Operation: Press the  key to change from *Status Mode* to *Menu Mode*. Press the  or  keys to scroll up or down and navigate to find menu options (function or parameter). Press the  key to select functions.



Adjustment Menu Example:

	NomVolt	↓↑
	BoostVolt	↓↑
	LoBattMaj	↓↑
Volt Adjustment →	LoBattMin	↓↑
	HiBattMaj	↓↑
	HiBattMin	↓↑
	LVBD	↓↑
	LVLD 1.1	↓↑
Volt Calibration →	VoltCal	↓↑
Change Password →	Password	↓↑
Set Boost Time →		↓↑
Start/Stop Boost →		
Auto Boost Conf. →	Enable/Disable	↓↑ & Threshold ↓↑
	Nxt Test Date Time	Date ↓↑ Time ↓↑
	End Volt	↓↑
Batt Test Setup →	MaxTestDur	↓↑
	Test Int	↓↑
	Guard Time	↓↑
Start/Stop Test →		
# Of Rectifiers→	Reset	
Charge Curr Lim. →	Enable/Disable	↓↑ & Max C.Curr ↓↑
Battery Setup →	NumOfString	↓↑
	CellCap Ah nn	↓↑
Output Control →	Voltage Ctrl / Temp Comp	↓
Change Date/Time →	Date	↓↑ Time ↓↑
	Alarm Output 1	↑
Relay Test →	Alarm Output 2	↑
	Batt Contactor	↑
	Load Contactor	↑
	Alarm Output nn	↑

Menus: When entering *Menu Mode* (Level 1), access *User Options*. By default, it is set to “read-only”. To make changes to the settings, enter the *Service Options* menu and enter the password.

Default password: 0003

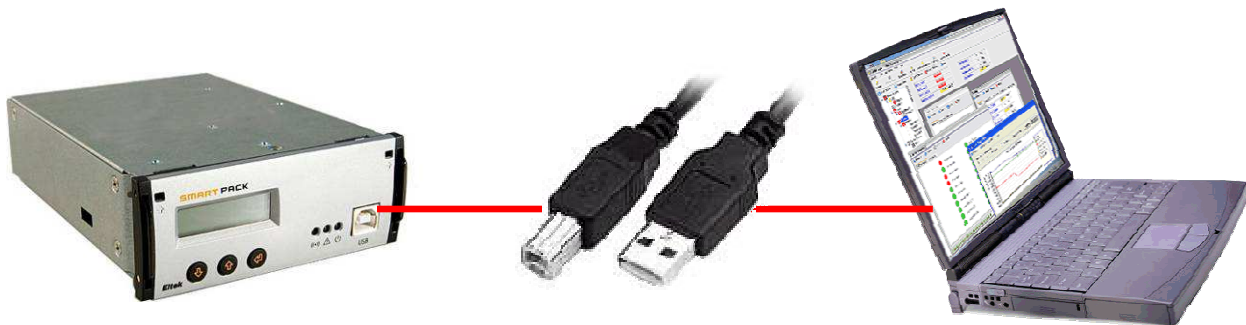
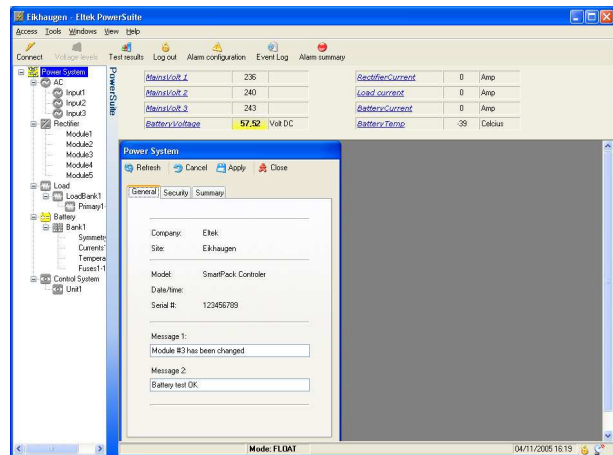
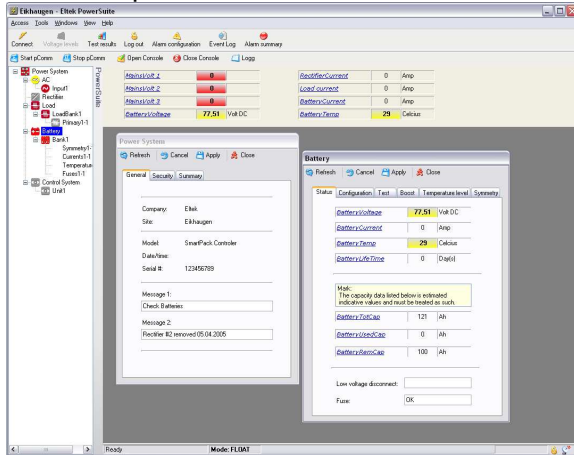
When the front keys are not in operation, the display is in *Status Mode*. The upper line continuously displays the battery voltage. The lower line scrolls the following information:

- Battery Current
- Load Current
- Active alarms
- Other messages

Local Computer Access

PowerSuite software must be installed on the PC to be used **before** connecting to the *Smartpack* controller. **Do not** connect USB prior to installation process. In most cases, **FrameNet** (also provided) must be installed prior to *Powersuite*.

Example screen shots:



Interface with a PC requires a standard A-B USB cable.

*To make changes to the settings enter the *Service Options* menu **Default password <0003>**

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

For further info on controller operation and adjustment, refer to the *User's Guide—Smartpack Monitoring & Ctrl Unit*.



9. Startup Checklists

This section includes basic checklists to assist the user in verifying proper installation and starting system operation.

Pre-Start Check

Power is OFF

CHECK THE FOLLOWING POINTS:	OK
1. Flatpack2 system installation is completed; The <i>Flatpack2 Installation Check List</i> is filled in. All cabling is securely terminated with correct polarity	☐
2. All battery and load Breakers / fuses are disconnected	☐
3. AC input cable(s) and AC earth wire (Ground) are terminated	☐
4. Site specific parameters and settings are known	☐
5. AC supply and all Breakers / fuses are switched OFF	☐

Start-up, No-Load & Load Adjustments

Power is ON

CARRY OUT FOLLOWING:	OK
1. Install all rectifier modules in desired locations	☐
2. Verify AC input voltage is correct; Measure and verify	☐
3. Switch ON the external AC feeds	☐
4. Verify all rectifier modules are working, Green power LEDs are ON Verify	☐
5. Verify The <i>Smartpack</i> is functioning Green power LED is ON Verify	☐
6. Connect a PC to the PS system Install the <i>PowerSuite</i> software, if required	☐
7. Verify DC output voltage; Measure and adjust as needed	☐
8. Measure battery voltage, confirm level, and close disconnect if present Verify correct polarity!	☐
9. Verify System Setup is in accordance with desired configuration Enter site spec. info in <i>PowerSuite</i>	☐
10. Connect all load Breakers / fuses, and verify no alarms are displayed	☐
11. Verify the rectifiers output current, and load function	☐
12. Verify System Alarm Setup is in accordance with desired configuration Configure alarm mapping in <i>PowerSuite</i>	☐
13. Use <i>PowerSuite</i> to simulate Alarm Relay conditions Verify all alarm relays are working correctly	☐
14. This completes the basic system start-up and configuration	☐



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