Quick Start Guide

Document 370001.103, Issue 1.1
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Modular with Smartpack2

IMPORTANT: Read these installation instructions before connecting to supply!

The latest version of this document and other Eltek product documents are available online at eltek.sharefile.com.

Related documents include:

- *Installation Guide: Modular with Smartpack2*, Doc. No. 370001.033
- *Configuration Guide: Eltek Smartpack and Compack Controllers*, Doc. No. 370013.063
- *Navigation and Menu Tree: Smartpack2 Controller*, Doc. No. 370017.033

Contact Information

To order parts and request documentation, please contact Customer Service by email at sales.us@deltaww.com or by phone at 1-469-330-1665.

For assistance with technical questions and solutions, please contact Technical Support by email at techsupport.us@deltaww.com or by phone at 1-800-435-4872.

Delta Part No. 5017154201

ELTEK

IMPORTANT: READ THIS FIRST
SAFETY NOTICES – DC Power Systems

Read and observe all safety statements and requirements before performing any installation or operation work on the power equipment.

Failure to comply with the safety statements and requirements contained in this document may result in injury and/or equipment damage.

Full product manuals are available online at: *eltek.sharefile.com*

For use in restricted access locations only
Only suitable for mounting on concrete or other non-combustible surface

The Modular DC power system accepts a nominal, single-phase AC voltage between 100 V and 277 V (±10%), depending on rectifier used, 50 to 60 Hz. It is capable of delivering a maximum DC output of 1200 A (depending on the number of rectifiers deployed) at an ambient operating temperature range of -40°C to +50°C. Systems are powered by Flatpack2 HE rectifiers and available for 48V DC output. (Flatpack2 3kW rectifers derate above 45°C.).

WARNING: HAZARDOUS VOLTAGE AND ENERGY LEVELS CAN PRODUCE SERIOUS SHOCKS AND BURNS. Only authorized, qualified, and trained personnel should attempt to work on this equipment. Refer to datasheets for full product specifications.

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). To avoid risk of being struck by lightning, do not disconnect or reconnect input and output power connectors during lightning storms. The output of the power supply is not intended to be accessible due to energy hazards.

WARNING: High leakage current is present. Earth connection is essential before connecting the supply.

WARNING: This product is intended to be protected by a surge protector. Failure to utilize appropriate surge protector could result in susceptibility to lightning surges or create a potential hazard due to power

CAUTION: All rectifiers employ internal double pole/neutral fusing. Fuses are not field-replaceable.

Each rectifier should be fed from a dedicated AC branch circuit of a terra neutral (TN) or isolated terra (IT) power system.

A readily accessible disconnect device shall be incorporated in the building installation wiring for all AC connections. Select wall breakers according to national and local electric codes.

Multiple AC sources are present. Disconnect all power before servicing.

If the plug end of an AC line cord is considered to be the primary disconnection means, reasonable access must be given to the plug and receptacle area. The receptacle must be fed with a breaker or fuse according to input current specifications of the rectifier; refer to national and local electric codes.

Use Underwriters Laboratories (UL)-listed, double-hole lugs for all DC connections to prevent lug rotation and inadvertent contact with other circuits. Terminal strip connections require only single-hole lugs.

Wire rated for 90°C is recommended for all DC connections. In practice, wires of a size larger than the minimum safe wire size are selected for loop voltage drop considerations. Follow national and local codes as well as company standards for wire sizing.

Alarm contacts are rated for a maximum voltage of 60 V, SELV (Safety Extra Low Voltage) and a maximum continuous current of 1A. Connection and mounting torque requirements are listed in the *Installation Guide: Trilogy with Smartpack2* (Doc. No. 370003.033).

Heat dissipation greater than the objectives listed in GR-63-CORE may occur. Additional equipment room cooling may be required. To cope with high heat release, aisle spacing may be increased and high heat-dissipating equipment may be located adjacent to equipment generating less heat.

It is recommended practice to ensure that all circuit breakers (including those for DC distribution) are in the OFF position during both installation and removal.

Eltek does not recommend shipping the power shelf with rectifiers installed. Rectifiers should be shipped in separate boxes.

Do not combine AC and DC modules in the same shelf. Do not install DC modules in AC shelves or AC modules in DC shelves.

WARNING: Protection of persons against electric shock:

Power cabling may be performed only by qualified personnel in accordance with local and national electric codes. Improper wiring can cause physical damage or injury. Input voltage from the power supply might be present. Improper connection may cause damage or serious injury. Ensure that the AC power supply source switch is in the OFF position. Use a voltmeter to check the presence of voltage from the SOURCE. Ensure that all power switches are in the OFF position – in the system, devices, and at supply. Improper wiring may cause bodily injury and equipment damage. Before performing maintenance, either unplug or disconnect the equipment from the power supply source in order to reduce the risk of electric shock or other possible hazards.

When working on electrical equipment in and for applications in Germany, regulations for the prevention of electrical accidents – as stated in DIN VDE 0105 – are summarized in the following five safety rules:

1. De-energize
2. Secure from re-energizing (“lockout”)
3. Verify that the equipment is de-energized
4. Ground and short-circuit
5. Insulate or cover any live or energized areas of nearby equipment

These five safety rules should be followed in order before starting work on electrical systems.

Only qualified electricians are to work on this equipment.

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 Eltek could void the user's authority to operate this equipment, as unauthorized changes may invalidate compliance.

Torque Settings

Table 1 shows recommended torque settings for mechanical and electrical connections according to screw or nut size. Not all screw sizes listed are necessarily present. These are recommendations only. Different torque values may be specified in the installation instructions.

Table 1 – Recommended Torque Settings

Screw or Nut Size	Minimum	Maximum
#10-32	20	22
#12-24	40	42
¼”- 20	50	58
5/16”-18	110	120
3/8″-16	200	220
Alarm Terminal Block	3	4
#6-32 GMT Fuse Terminal Block	7	8

Insulated Required Tools

Cable Crimpers

Torque wrench

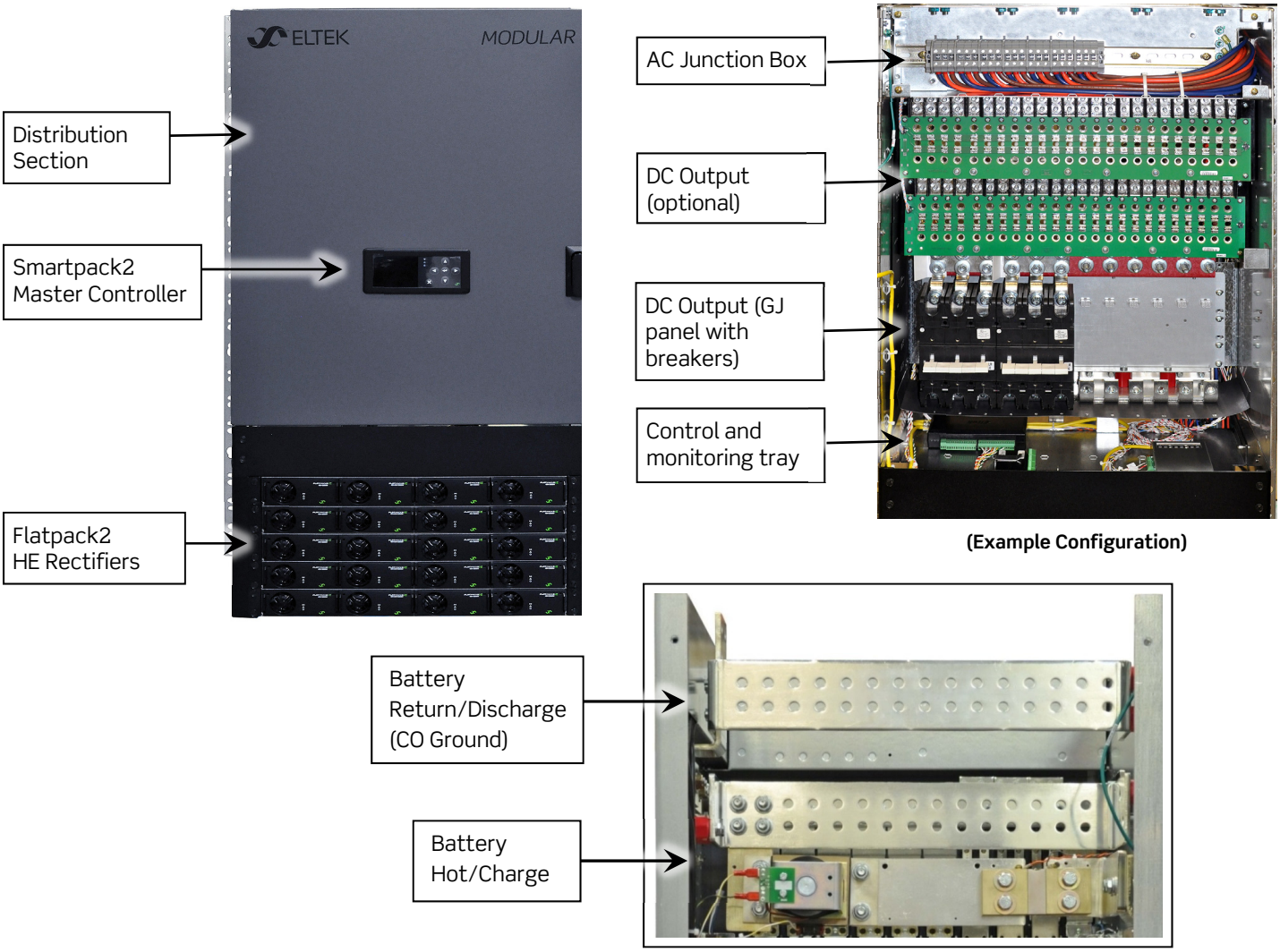
Wire cutters and strippers

Multimeter

Lifting equipment

Socket set, ¼ - 1"

Overview



(Example Configuration)

Mounting the Power Plant

If the unit was purchased without a relay rack, lifting equipment is suggested, to mount in an existing rack.

Mark the floor for anchor positions and install earthquake-zoned anchors as required, per specifications of anchor manufacturer.

WARNING: Each Modular HE power plant has an empty weight of **225 lbs (102 kg)**, excluding relay racks. Do not attempt to lift, move, or otherwise shift the rack without proper lifting equipment and capable assistance. Racks should be installed on, and bolted to, a concrete, ground-level floor. Proceed only when such safety measures are in place.

Ground

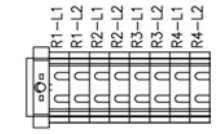
To make a frame ground connection:

1. If installing the plant within an existing rack, either use paint-piercing screws (1/4-20), or remove coating to provide frame connection.
2. The CO ground connection is referenced to the upper bar, using 3/8" x 1" lugs.

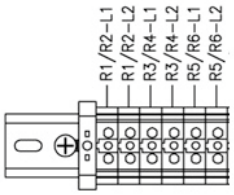
AC Connections

Table 2 – AC Connections

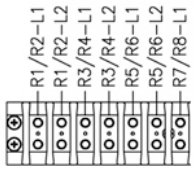
AC Input	Rectifiers per feed	Max Wire Size	Minimum Circuit Breaker	Torque (in-lbs)
A1	1 (single-feed)	10 AWG	25	4.4–6.1
A2	2 (dual-feed)	6 AWG	50	13.3–16.0
A3	2 (dual-feed) lug	6 AWG	50	20
A4	3 (three-phase)	6 AWG	40	13.3–16.0



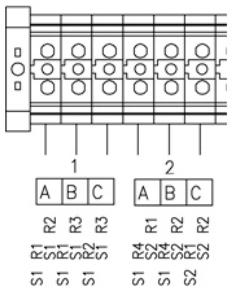
A1– Compression screw



A2– Compression screw



A3– Barrier strip – lug



A4– Compression screw

To make AC connections:

1. Turn OFF AC breakers before making connections.
2. Route AC cables through desired 1" knockouts at the top of the cabinet.
3. Connect earth ground first, in the AC junction box. For more details, see *the Installation Guide: Modular with Smartpack2*, Doc. 370001.033.
4. Connect input wires to termination corresponding to the rectifier positions. Shelves are numbered from left to right, bottom to top. (For more information, refer to *Installation Guide: Modular with Smartpack2,* (Doc. No. 370001.033).

Batteries

The rear of the distribution section contains battery connections. (See page 5.) There are fourteen (14) landings per polarity for battery connections, plus an extra set of landings for CO ground. Each landing consists of two 3/8" studs with 1" spacing.

DC Output Connections

There are two kinds of DC output connections (optional):

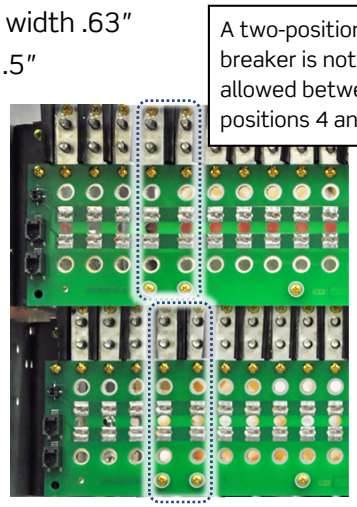
- Plug-In Board (see below) – maximum tongue width .63"
- GJ/GS Panel (see page 7) – maximum width 1.5"

Plug-In Board

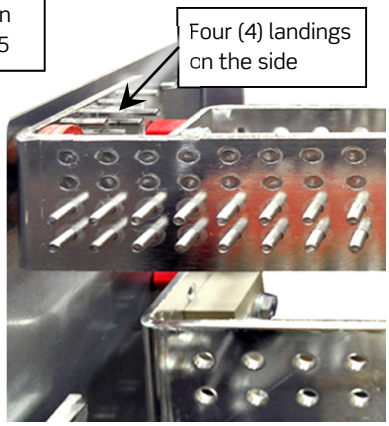
Note: The distribution alarm circuit requires the use of breakers provided by Eltek.

To make cable connections:

1. The plug-in board has 24 positions. Make connections to the appropriate positions, using two-hole lugs having 1/4" diameter holes on 5/8" centers. Torque connections to 51-58 in-lbs.



Plug-In Breaker Board



Return Landings for Two Plug-in Boards (50 positions)

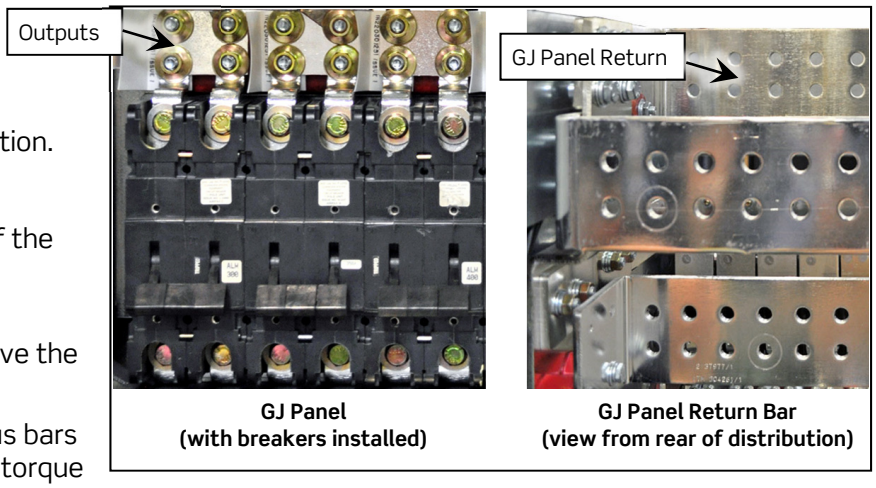
2. Make ground connections to internal returns, if equipped, or external return bar, as required.
3. Make a note for each position on the label provided on the distribution door.
4. Breakers are installed vertically with the switch up in the ON condition.

GJ/GS Panel

GJ/GS breakers are usually installed at the factory.

To make connections.

1. Make sure each breaker is in the OFF position.
2. Double-check polarity.
3. Route DC output wires through the top of the panel.
4. Make output connections to the hot connections ("landings") immediately above the breakers and torque to 20 ft-lbs.
5. Make return connections to the return bus bars at the top of the distribution section and torque to 240 in-lbs.



GJ Panel
(with breakers installed)

GJ Panel Return Bar
(view from rear of distribution)

Alarm/Controller Connections

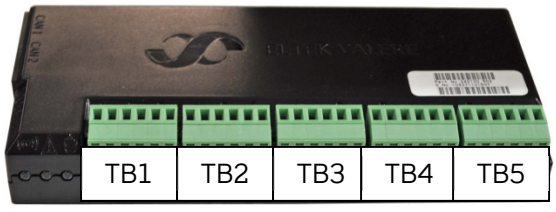
Terminal Block	1						2						3						4						5					
Terminal	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Designation	Input 1 (–)	Input 1 (+)	Input 2 (–)	Input 2 (+)	Input 3 (–)	Input 3 (+)	Input 4 (–)	Input 4 (+)	Input 5 (–)	Input 5 (+)	Input 6 (–)	Input 6 (+)	Output 1 (NC)	Output 1 (C)	Output 1 (NO)	Output 2 (NC)	Output 2 (C)	Output 2 (NO)	Output 3 (NC)	Output 3 (C)	Output 3 (NO)	Output 4 (NC)	Output 4 (C)	Output 4 (NO)	Output 5 (NC)	Output 5 (C)	Output 5 (NO)	Output 6 (NC)	Output 6 (C)	Output 6 (NO)

Six form "C" relays are provided.

To make connections alarm connections:

1. Route alarm cable (not provided) from alarm transport to the Power Cabinet.
2. Connect the alarm cable to the I/O Monitor in the Power Cabinet (maximum wire size is 18 AWG; torque is 3 in-lbs.).

   Relays are: 1 – Major, 2 –Minor, 3 –High Voltage, 4 –Low Voltage, 5 –Rectifier Failure, 6 –Fuse Breaker



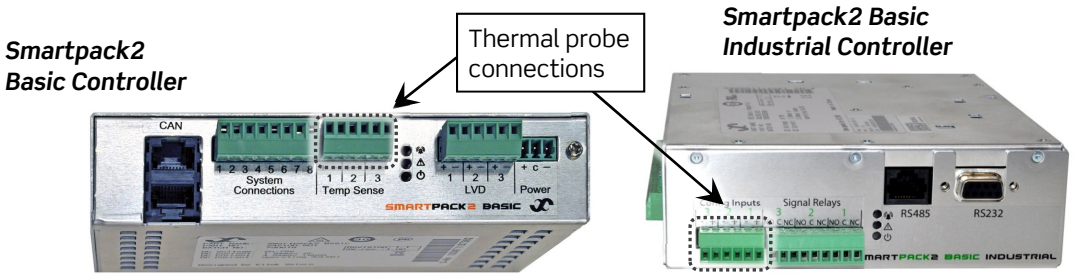
I/O Monitor, Type 2

The following table shows alarm mapping with only one I/O unit.

Table 3 – Default Alarm Output Relay Assignments

Alarm	Relay 1 (Major)	Relay 2 (Minor)	Relay 3 High Voltage	Relay 4 Low Voltage	Relay 5 RFA	Relay 6 (Critical)
Power Major	X					
Power Minor		X				
High Voltage (HV1)		X	X			
High Voltage (HV2)	X		X			
Battery Discharge		X		X		
Very Low Voltage (Battery Discharge)	X			X		X
Rectifier Alarm		X			X	
Dual Rectifier Alarm	X				X	
Controller Fail	X					
DC 1 Fuse Alarm	X					X
AC Mains	X					

Temperature Probes



Temperature Probe Inputs

To install temperature probes:

1. Identify temperature probe connections that are necessary for your installation.
2. Connect the red wire of the temperature probe to the positive (+) input; connect the black wire of the temperature probe to the negative (–) input.
3. Torque each connection according to 3 in-lbs.
4. If batteries are present, route the temperature probe cable to the batteries, and connect to the positive terminal at the center of the string.
5. Repeat steps, as necessary, for additional connections.

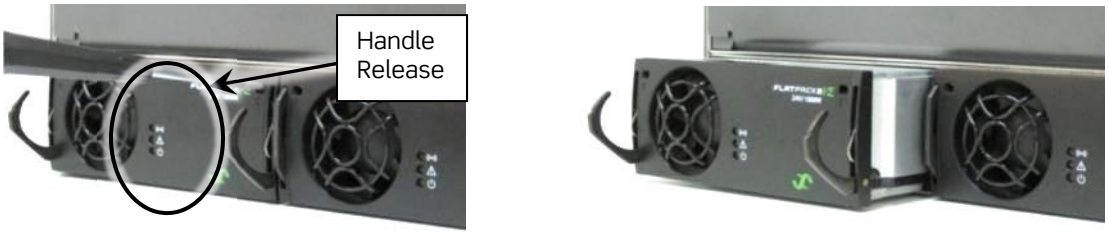
Turn-Up

To turn-up the system:

1. Check that all AC and DC connections are secure.
2. Check that all AC and DC breakers are in the off position.
3. Install rectifiers. (For additional details, see the section, “Rectifier Installation,” in the *Installation Guide: Modular with Smartpack2* , Doc. No. 370001.033).

To install Flatpack2 modules:

1. Release the handles by inserting a small flat-blade screwdriver into the release slots and pressing the tip upward; extend each handle.

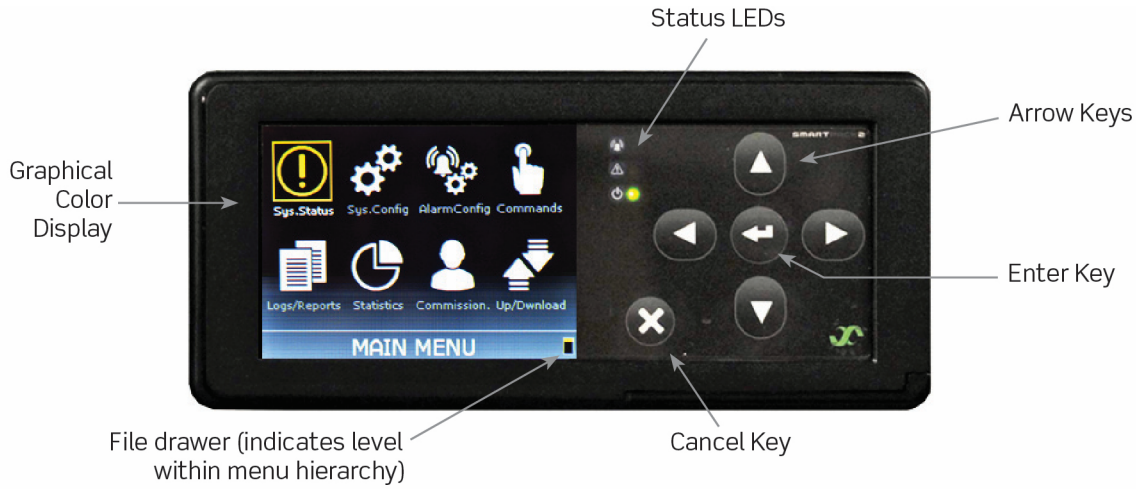


Release Handles on Modules

2. Slide the module firmly into the shelf.
3. Activate AC breaker for position #1, but leave all others off.
4. Latch the handles to lock the rectifier in place.
5. Allow a 2 second delay before inserting the next module.
   Note: the rectifier slots are numbered from bottom to top, left to right.
6. Allow the controller to power-up. (An alarm may be present.)
7. Verify system polarity with a voltmeter.
8. Activate battery breakers.
9. Activate load breakers.
10. Install any remaining modules, repeating steps 1 – 5 for each module.
11. Activate remaining DC breakers one at a time, in order desired.

Basic Controller Functions

The Smartpack2 Master Controller provides flexibility for monitoring and configuration, using either the display on the face of the controller, or by using a web browser interface on a computer connected to the controller with an Ethernet cable. The controller navigation panel is illustrated in the following figure.



Navigation Keys

	**Enter Key**	To change from Status mode to Menu mode and to select options, enter values		**Left or Right Key**	To navigate one page up or down and to highlight options
	**Cancel Key**	To navigate to previous level, view alarms, and cancel options and values		**Up or Down Key**	To navigate up or down, highlight options and increase or decrease value.

For information regarding controller configuration, see the printed copy of the default configuration that shipped with your system.

For an explanation of common configuration tasks, see the *Configuration Guide: Eltek Controllers,* Doc. No. 370013.063. For more extensive information, you can also consult the *User Guide: Eltek Controller Web Interface* (Doc. No. 370035.013).

If you make any changes to the default configuration, Eltek recommends that you make a backup copy of your configuration, by following the instructions in the *Configuration Guide*.

For assistance with technical questions and solutions, please contact Technical Support by email at techsupport.us@deltaww.com or by phone at 1-800-435-4872.

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