Quick Start Guide

Document 370012.103, Issue 1.4
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Flatpack S DC System

1U Configurations

Wire Feed	DC Distribution	SELV Alarming (P/N)	Dry Contact Alarming (P/N)
Rear Feed (Load and Battery)	10 GMT Fuses, 2 Plug-in CBs	330180 330179 (no LVBD)	350196 350204 (no LVBD)
Side Feed (Load) **Rear Feed (Battery)**	10 GMT Fuses, 2 Plug-in CBs	332748 320056 (no LVBD)	350197 350193 (no LVBD)
Rear Feed (Load and Battery)	4 Plug-in CBs		350195 350200 (no LVBD)

332748/320056
350197 / 350193

330180/330179
350196 / 350204

347558/347559

IMPORTANT: Read installation instructions before connecting to supply!
The latest version of this document and other Eltek product documents are available online at available online at *eltek.sharefile.com*.

Flatpack S Installation Guides		Controller User Guides	
Quick Installation Guide: Flatpack S, 1U PS Systems	Doc #356835.103	User Guide: Smartpack S	Doc #350030.013
Quick Start Guide: Flatpack S PS System (Integrated, Cabinet, Outdoor Applications)	Doc #356846.103	Functionality Description: (Various Eltek Controllers)	Doc #350020.073
		Configuration Guide: Smartpack2, Smartpack S, Compack Controllers	Doc #350013.063

Contact Information

To order parts and request documentation, please contact Sales by email at *sales.us@eltek.com* or by phone at 1-469-330-1592.

For assistance with technical questions and solutions, please contact Technical Support by email at *tech.support@eltek.com* or by phone at 1-800-435-4872.

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IMPORTANT: READ THIS FIRST
SAFETY NOTICES – DC Power Systems

Read and observe all safety statements and requirements on this sheet 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, and it may void the user's authority to operate the equipment.

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

WARNING: The equipment is to be connected to supply mains by a qualified personal in accordance with local and national codes (e.g. NEC, CEC, etc).

WARNING: FAILURE TO SIZE THE BREAKER AND WIRING PROPERLY CAN RESULT IN NUISANCE BREAKER TRIPS OR EVEN FIRE. Always follow NEC (national electrical code) rules and your local company practices when selecting wires and protection devices.

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.

WARNING: HIGH LEAKAGE CURRENT! Earth connection is **essential** before connecting supply.

WARNING: For safety, the power supply is required to be reliably connected to PROTECTIVE GROUND.

WARNING: Do not disconnect and reconnect I/O power connectors during a lightning storm.

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

NOTE: Equipment is intended for deployments where an external Surge Protective Device (SPD) is utilized.

NOTE: Heat dissipation greater than the objectives listed in GR-63-CORE may occur. Additional equipment room cooling may be required.

CAUTION: Keep hands, hardware and tools clear of the fans. Fans are thermostatically controlled and will turn on automatically as a function of temperature.

WARNING: Protection of persons against electric shock:

Input voltage from the power supply might be present. Improper connection may cause damage or serious injury. Make sure the AC service panel circuit breakers feeding the system are OFF and locked out during installation, especially while making cable connections. Use a voltmeter to check the presence of voltage from the supply. 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 source in order to reduce the risk of electric shock or other possible hazards.

Observe all local and national electrical, environmental, and workplace codes.

Each power shelf should be fed from a dedicated AC branch circuit of a terra neutral (TN) power system.

The plug end of the AC line cord(s) is considered to be the primary disconnection means, and reasonable access must be given to the plug and receptacle area. The receptacle must be fed with a breaker or fuse according to NEC requirements. For hard-wired AC connections, a readily-accessible, code-compliant disconnection device must be incorporated in the building installation wiring. Select circuit breaker sizes according to national and local electric codes. The PE ground wire should be slightly longer than the AC input wires.

The output of the power supply is not intended to be accessible due to hazardous energy.

Use Underwriters Laboratories (UL)-listed, two-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. Always follow NEC rules and local/company practices when selecting wires and protection devices.

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. Use of lock out/ tag out is recommended.

Eltek does not recommend shipping the power shelf with rectifiers installed. Rectifiers should be shipped in separate boxes, as provided by Eltek. Rack mounting must be performed in accordance with instruction provided by the manufacturer to avoid potential hazards.

Before installing the power system the following rack-mounted items should be considered:

- **Attention:** Observe precaution for handling electrostatic sensitive devices.
- **Elevated Operating Ambient:** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- **Reduced Air Flow:** Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Required airflow clearances: **30 mm (1.2")** minimum, both front and back.
- **Mechanical Loading:** Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- **Circuit Overloading:** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- **Reliable Earthing:** Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

NOTE: The power system complies with Part 15 of Federal Communications Commission (FCC) Rules. Its 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.

Changes or modifications to the system not expressly approved by the party responsible for the compliance could void the user's authority to operate the system.

Lire et respecter tous les communiques de sécurité et exigences sur ces pages avant d'exécuter n'importe installation ou utilisation de ce matériel d'énergie.

Défaut de se conformer aux exigences et déclarations contenu dans ce document peut résulter en blessure et/ou dommage de matériel et pourrait annuler l'autorisation d'utiliser ce matériel.

Les guides d'utilisation complet sont disponibles en ligne a: eltek.sharefile.com

Pour utilisation dans des locaux a accès limité.
Propice pour montage sur béton ou autre surface non combustibles seulement..

AVERTISSEMENT: L'équipement doit être relié au réseau d'alimentation par du personnel qualifier conformément avec les codes local et national (ex: CNE, ACNOR, etc.). Déférer au manuel d'installation pour les spécifications entières.

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AVERTISSEMENT: DEFAUT D'UTILISER UN DISJONCTEUR CA ET CABLAGE APPROPRIER PEUT RESULTER EN DEFAILLANCE D'ENNUI DE DISJONCTEUR OU FEU. Toujours suivre les codes national et local ainsi que vos pratiques de compagnie pour choisir le câblage CA et les dispositifs de protection.

AVERTISSEMENT: TENSIONS HAZARDEUSES ET NIVEAU ENERGETIQUE PEUVENT PROVOQUER DES CHOCS ET BRULEURES SERIEUSES. Seulement le personnel autorise, qualifier et former devrait tenter de travailler sur ce matériel.

AVERTISSEMENT: COURANT DE FUITE ELEVEE ! Un branchement de mise à la terre est essentiel avant de relier la source.

AVERTISSEMENT: Pour sécurité le bloc d'alimentation est requis d'être relier a une MISE A LA TERRE POSITIVE.

AVERTISSEMENT: Ne pas débrancher ou rebrancher les connecteurs d'énergie durant un orage électrique.

PRUDENCE: Redresseurs utilise fusibles interne bipolaire/neutre. Fusibles ne sont pas remplaçables par l'utilisateur.

Recommended Tools and Torque

Tools

- ⅛" flat-head screwdriver
- PH2 Phillips screwdriver
- ⅜" nut driver

Table 1 – Torque Recommendations

Screw or nut size	Minimum (in-lbs)	Maximum (in-lbs
M3	5	6
M4	18	22
#10	30	32

Rectifier Specifications

NOTE: Ensure that line cords and AC breakers or fuses are properly sized to accommodate the maximum current draw of all rectifiers that are powered by each feed.

NOTE: Make sure the load requirement does not exceed the current rating (as labeled on the shelf), before installing rectifiers. It is possible to exceed the output ratings of some shelves if they are fully populated with the Flatpack S 48V/1800W HE rectifiers, which can output up to 36.3A of current.

Maximum weight per rectifier: 1.9 lbs. (850 g)

Table 2- Flatpack S Rectifiers

Flatpack S Rectifiers Model	48V/1800W HE (241122.125)	48V/1000W HE (241122.105)
Rated Input Voltage Range	100 – 250 V ac	100 – 250 V ac
Rated Maximum Input Current	10.4 A-rms	6.0 A-rms
Rated DC Output	53.5V / 33.7 A	53.5V / 18.7 A
Maximum Output Voltage	57.7 V dc	57.7 V dc
Operating Temperature Range	–40 to 65°C –40 to 149°F	–40 to 65°C –40 to 149°F

Table 3- Recommended AC Breaker and Wire Sizes

Flatpack S Rectifiers	48V/1800W HE (241122.125)		48V/1000W HE (241122.105)	
Max Current per Rectifier	10.4 A-rms		6.0 A-rms	
Number of Rectifiers	Recommended Breaker Size	Minimum Wire Size	Recommended Breaker Size	Minimum Wire Size
1 Rectifier	15	14	10	14
2 Rectifiers	30	10	15	14
The AC Input Voltage Range is 100 – 250V ac.				

NOTE: Wire sizes are based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (2011 NEC). Table 310.15(B)(16) (formerly Table 310.16) for copper wire at 90°C conductor temperature, operating in ambient of 30°C, was used. For other operating conditions, refer to the NEC.

Installing Rectifiers, Controller, and Blind Panels

Removing and Installing *Flatpack S* Rectifiers

1. Ensure that rectifiers are unlocked during installation. Using a screwdriver, turn the locking screw to the unlocked position ( ).

   Note: The rectifier can be mounted in the power shelf with the locking screw in either locked and unlocked positions, but the recommended practice is to keep the rectifier unlocked during installation and removal, until the unit is properly in place.

2. Insert each rectifier into position by sliding it fully into the power shelf (providing support from underneath), so that it makes proper contact.

Removing and Installing *Smartpack S* Controllers

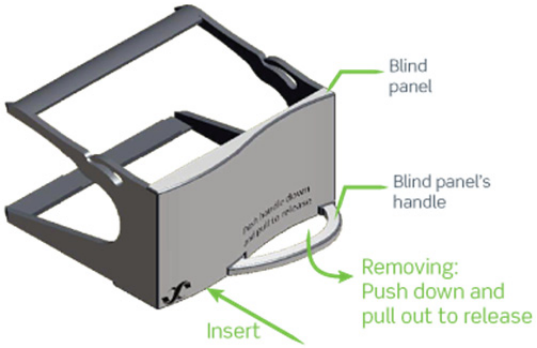
The shelf is shipped with the Smartpack S controller preinstalled. If it is necessary to remove or reinstall the controller, note the following steps.

1. Ensure that the controller is unlocked during removal or installation. Using a screwdriver, turn the locking screw to the unlocked position ( ).

   Note: When the mechanism is locked (position #1), the Ethernet port can be accessed by sliding the front section of the controller forward from within shelf. The controller can be mounted in the power shelf with the locking screw in either locked and unlocked positions, but the recommended practice is to keep the controller unlocked during installation and removal, until the unit is properly in place.

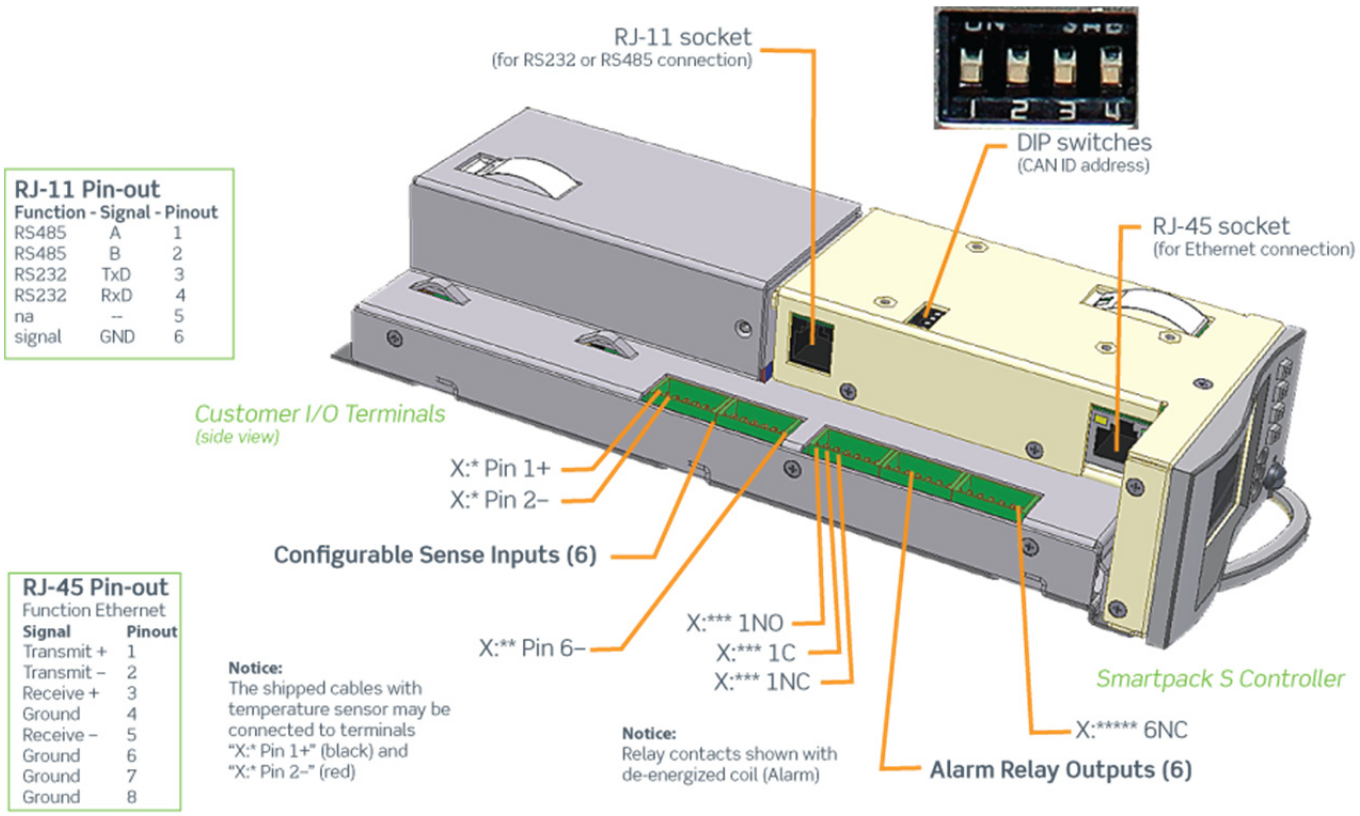
2. Insert the controller into position by sliding it fully into the power shelf (providing support from underneath), so that it makes proper contact

Removing and Installing Rectifier Blind Panels



Location of Terminals and Ports – *Smartpack S* Controller

The Smartpack S controller (P/N 242100.410) contains an Ethernet port for a network connection. There are six alarm inputs and six output alarm relays built-in. See the diagram below for a summary of all available terminals and ports.



RJ-11 Pin-out

Function	Signal	Pinout
RS485	A	1
RS485	B	2
RS232	TxD	3
RS232	RxD	4
na	–	5
signal	GND	6

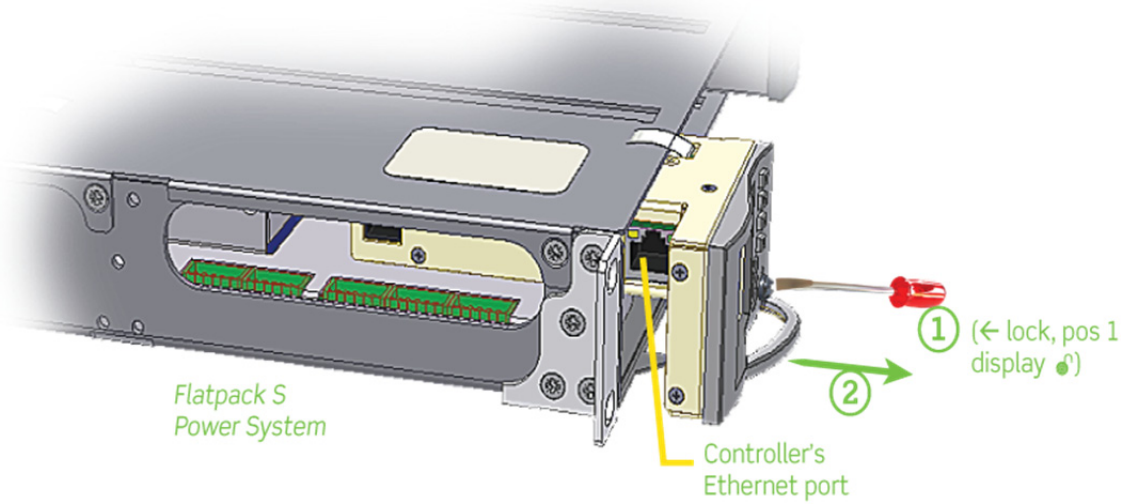
RJ-45 Pin-out

Function Ethernet

Signal	Pinout
Transmit +	1
Transmit –	2
Receive +	3
Ground	4
Receive –	5
Ground	6
Ground	7
Ground	8

Accessing the Controller's Ethernet Port

NOTE: Due to space limitations, the Ethernet cable must have a connector with no strain relief boot. Ethernet cables without strain relief boots on either a straight connector or a 90-degree left-angle connector are available from Eltek.



Overview: *Flatpack S* Shelf Specifications

Flatpack S 1U shelves are available in a variety of capacities and distribution configurations. The table below summarizes the distinctive features of each shelf.

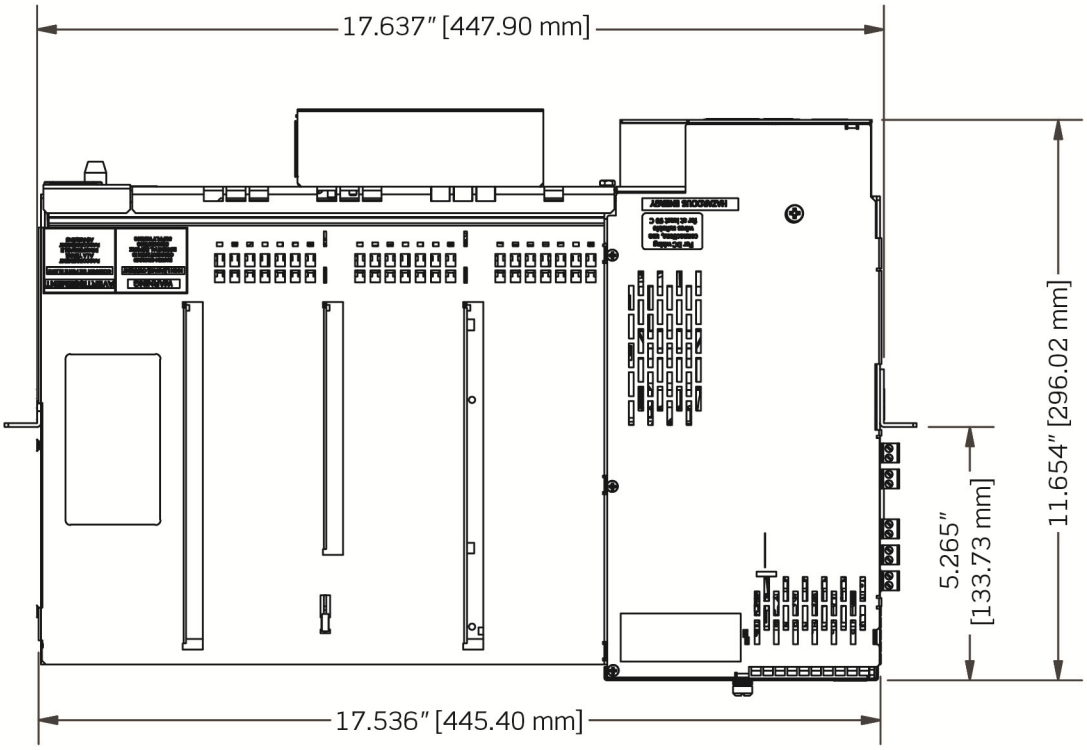
Table 4 – Flatpack S Shelves

Shelves	System Profile			Dimensions		Rectifier Profile		AC Input	Mounting
Part Number(s)	System Voltage	Wire Feed Direction	Dc Distribution	Rack Width	Shelf Depth	Rectifier Slots	Maximum Output (dc)	Ac Feed Type & Terminal Type	Rack Mount Options
332748 320056 (no LVBD)	48 V	Side (Load) Rear (Battery)	10 GMT Fuses 2 Plug-in CBs	19″	11.6″	3	80A	Individual-feed Barrier-strip	Mid only
330180 330179 (no LVBD)	48 V	Rear	10 GMT Fuses 2 Plug-in CBs	19″	11.6″	3	80A	Individual-feed Barrier-strip	Front Mid
350197 350193 (no LVBD)	48 V	Side (Load) Rear (Battery)	10 GMT Fuses 2 Plug-in CBs	19″	11.6″	3	80A	Individual-feed Barrier-strip	Mid only
350196 350204 (no LVBD)	48 V	Rear	10 GMT Fuses 2 Plug-in CBs	19″	11.6″	3	80A	Individual-feed Barrier-strip	Front Mid
350195 350200 (no LVBD)	48 V	Rear	4 Plug-in CBs	19″	11.6″	3	80A	Individual-feed Barrier-strip	Front Mid

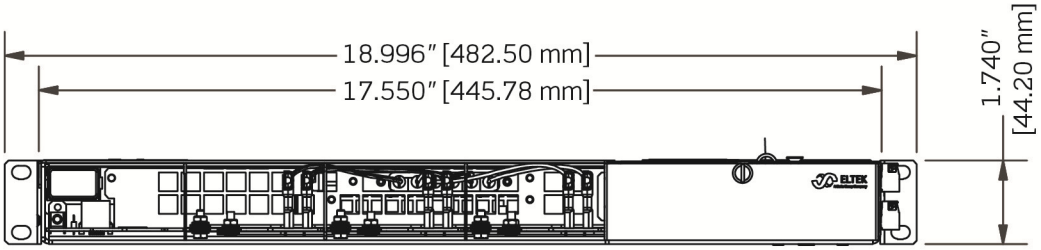
NOTE: All shelves are equipped with a *Smartpack S* controller.

Shelf Dimensions and Minimum Clearances

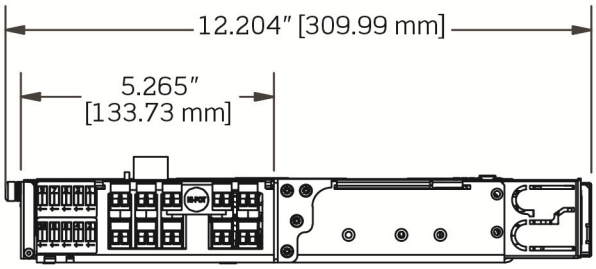
The *Flatpack S* 1U shelves are designed with a small footprint for use in a variety of applications where space is limited, such as outdoor cabinets. The dimensions and recommended clearances are provided below.



Dimensions (top view)



Dimensions (front view)



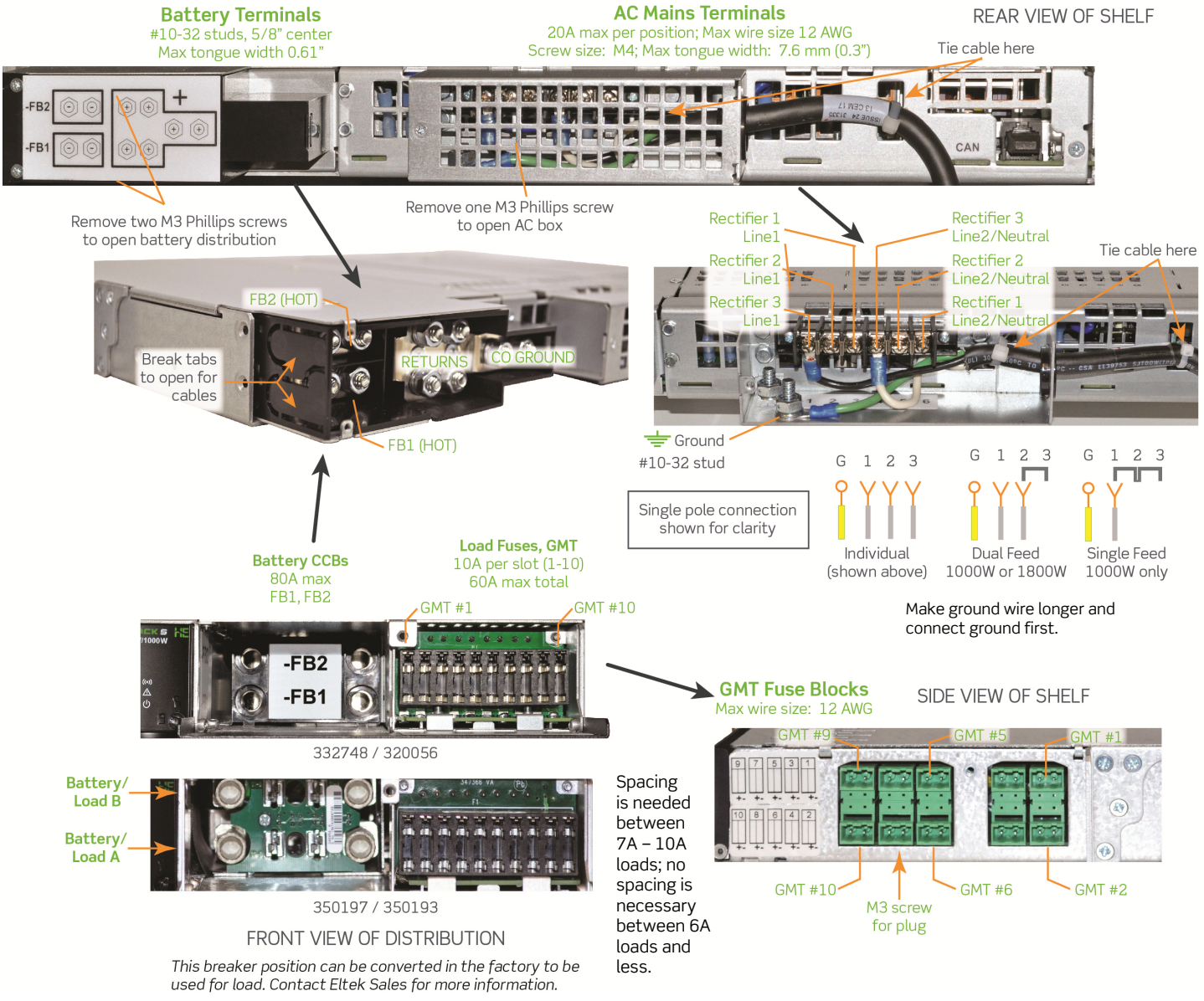
Dimensions (side view)

Overview: Flatpack S 48V, 3-Rectifier Shelf (332748/320056/350197/350193)

10 GMT Fuses, 2 CBB Circuit Breakers

Parts Overview

Location of Terminals

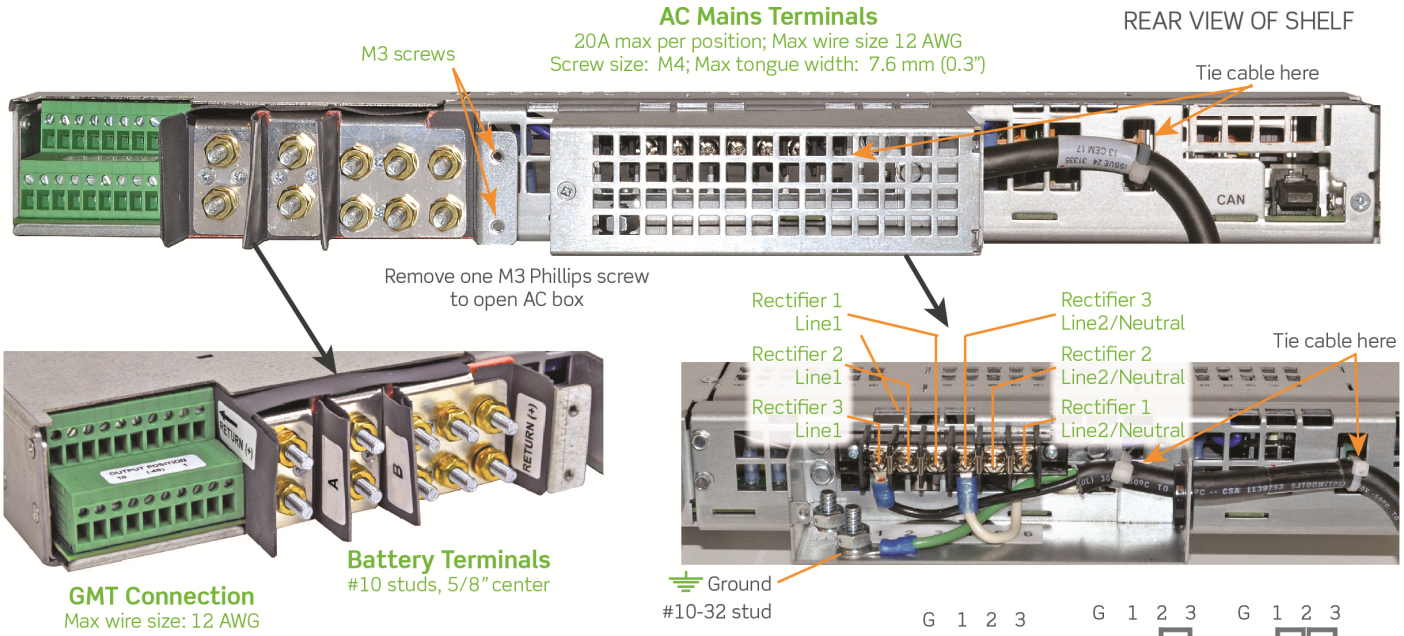


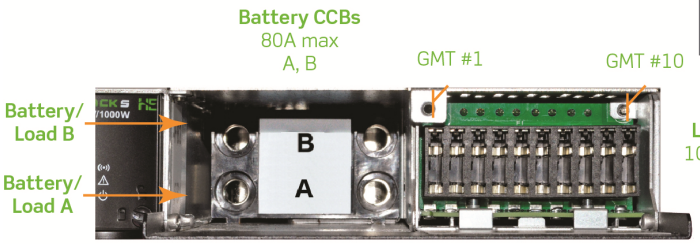
Overview: Flatpack S 48V, 3-Rectifier Shelf (330180/330179/350196/350204)

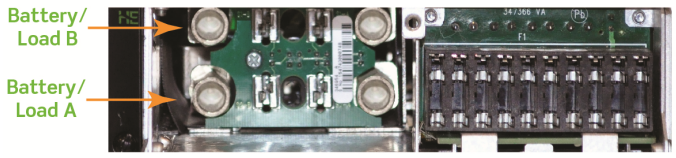
10 GMT Fuses, 2 CBB Circuit Breakers

Parts Overview

Location of Terminals







FRONT VIEW OF DISTRIBUTION

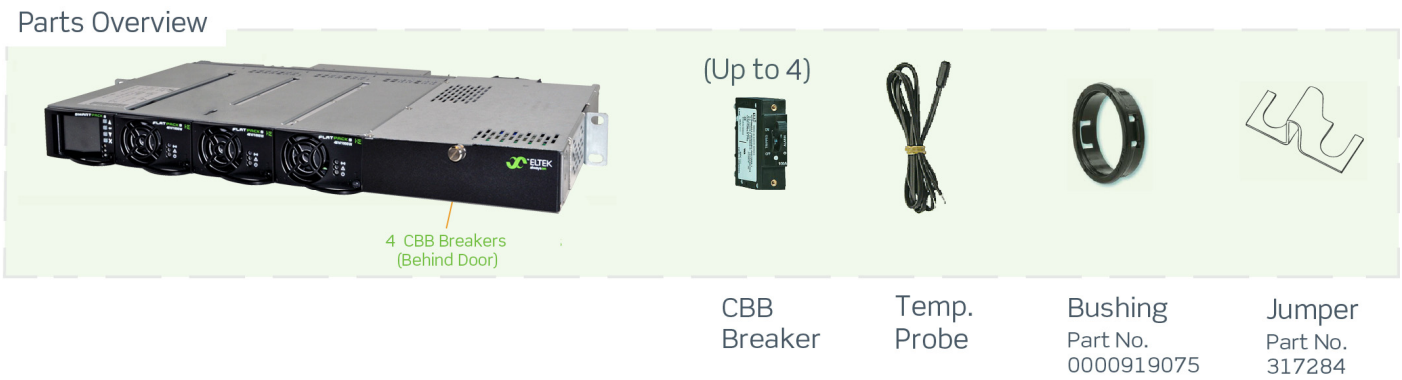
This breaker position can be converted in the factory to be used for load. Contact Eltek Sales for more information.

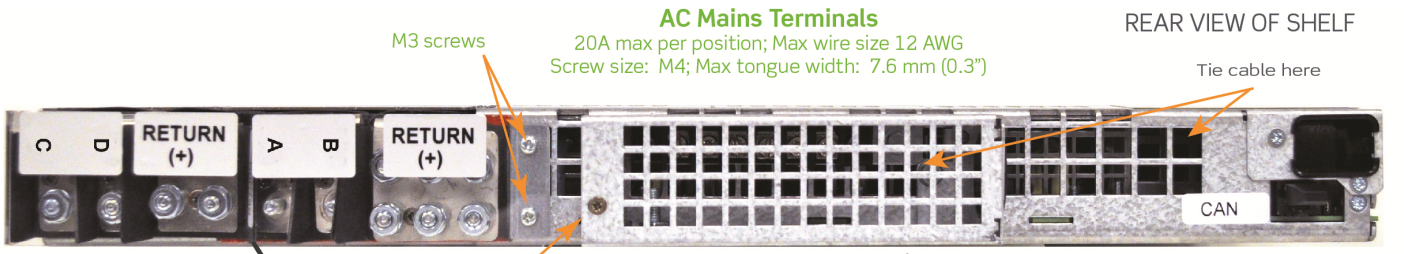
Make ground wire longer and connect ground first.

Spacing is needed between 7A–10A loads; no spacing is necessary between 6A loads and less.

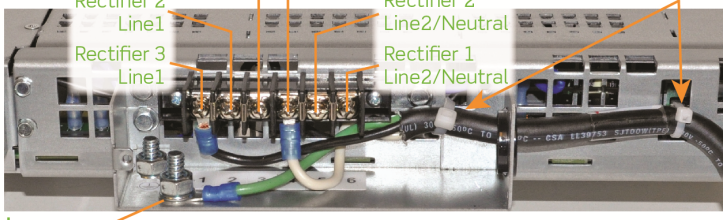
Overview: Flatpack S 48V, 3-Rectifier Shelf (350195/350200)

4 CBB Circuit Breakers



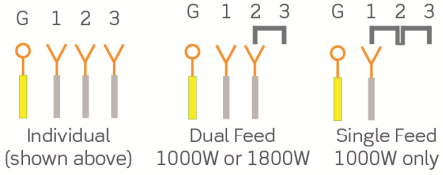


Terminals
#10 studs, 5/8" center



Ground
#10-32 stud

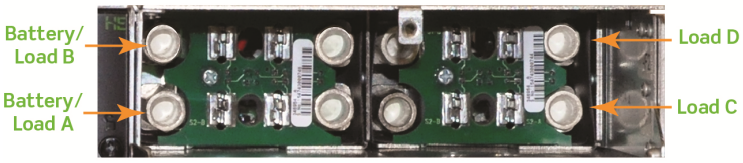
Single pole connection shown for clarity



Make ground wire longer and connect ground first.

Battery/Load CCBs
80A max load
A, B

Load CCBs
80A max load
C, D



350195 / 350200

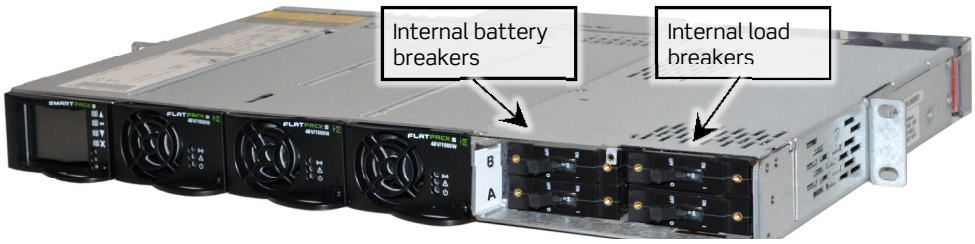
FRONT VIEW OF DISTRIBUTION

Start Up

Before Starting the System

1. Check that all electrical connections are secure.
2. Install rectifiers (if they were not installed already).

WARNING: If connecting batteries, note that improper battery connections can cause injury or death and may ignite a fire.



Starting the System

1. Switch on external AC Mains circuit breakers.
2. Verify AC input voltages are OK and green LED lamps are on.
3. Verify DC output voltage (Vout) is OK (for example, unplug FB1 and measure). Adjust if necessary.
4. Verify all Alarm Relays work properly.
5. Switch ON internal Battery circuit breakers. FB1 and FB2.
6. Verify Vout = FVbatt or Vload. Adjust if necessary.
7. Switch ON internal Load circuit breakers, if applicable.
8. Switch ON external Load circuit breakers.
9. Verify no alarms are displayed.

Adjusting DC Output/Battery Charging Voltage

Using the controller's front keys:

1. Select **System Configuration** › **Power System** › **System Voltage Levels** › **Reference Voltage**.
2. Adjust the Voltage.

Alarm Relay Test

Using the controller's front keys:

1. Select **Command** › **Output Test**.
2. Select relay to test; relay contacts will toggle for several minutes.

For system operation and monitoring information, consult the documentation listed on the front page of this guide.

COMMISSIONING PROCEDURE

System Data — Flatpack S System

System Order No.	*Flatpack S Power Supply System, type*		*Article No.*
Site name			
Serial No.	*Software Version No.*		*Rectifiers, type and number of*
AC Input Voltage, measured	*Battery Type, if applicable*	*Battery Capacity*	*Commissioning carried out by, name*

Pre-Start Check — Power is OFF!

CHECK FOLLOWING:		OK
1. Flatpack S System installation is completed	All cabling is securely terminated with correct polarity	☐
2. All external load MCBs/circuit breakers/fuses are switched OFF		☐
3. AC input cable(s) and AC wire (PE) are terminated		☐
4. Site specific parameters and settings are known		☐
5. AC supply and all external and internal MCBs/circuit breakers/fuses are switched OFF		☐

Start-up, No-Load & Load Adjustments — Power is ON!

CARRY OUT FOLLOWING:		OK
1. Disconnect all rectifier modules (keep original location)		☐
2. Switch ON the system (external AC MCBs/circuit breakers/fuses ON		☐
3. Verify that AC input voltage is correct; then turn OFF AC power	Measure and verify	☐
4. Connect all Flatpack S rectifiers in their original locations; then turn AC power back ON		☐
5. The Smartpack S controller and all rectifier modules are working, LEDs are ON	Verify	☐
6. Connect a PC to the PS system	Use a standard Ethernet cable and access the controller	☐
7. DC output voltage	Measure and adjust	☐
8. Alarm relay test	Verify all alarm relays are working correctly	☐
9. System setup is in accordance with configuration	Enter site spec. info via front keys or PC)	☐
10. Adjust DC output voltage to equal measured battery voltage	Check for correct polarity!	☐
11. Unplug all rectifiers but one, and connect all battery fuses/CBs		☐
12. Adjust DC output voltage to equal nominal battery or load voltage		☐
13. Turn off AC power		
14. Plug in again all rectifiers, turn on AC power, and verify the rectifiers' current sharing		☐
15. Verify no alarms are displayed		☐

Approval

Responsible of commissioning, sign	*Date*	*Approved by customer, sign*

MAINTENANCE PROCEDURE

System Data — Flatpack S PS System

Flatpack S Power Supply System, type			*Article No.*
Site name			
Serial No.	*Software Version No.*		*Rectifiers, type and number of*
AC Input Voltage, measured	*Battery Type, if applicable*	*Battery Capacity*	*Commissioning carried out by, name*

WARNING: Maintenance work on live equipment is only to be performed by authorized and qualified persons using calibrated instruments of measurement and insulated tools. Hazardous voltages inside may cause terminal injury.

System Inspection — Power is ON!

CARRY OUT THE FOLLOWING:	OK
1. Site specific parameters and settings are known. User manuals and site-specific connection and arrangement drawings are available.	☐
2. The battery bank has been fully charged in advance. At least for 12 hours since start-up or mains failure. Enables correct measurements and calibration.	☐
3. The equipment is free from damage, dust, or dirt; verify. Carefully vacuum clean or remove any accumulation of dust, corrosion, or dirt.	☐
4. All cabling and copper bars are securely terminated and supported. Correct any loose connections, excessive cable temperature, defective insulation, etc.	☐
5. The system controllers and all rectifier modules are ON, no alarm present; verify. Otherwise, correct and put the PS system in normal mode of operation.	☐
6. All rectifier's functionality and controller's keys and display work OK; verify. Correct possible abnormalities before continuing.	☐
7. Connect the system's controller to a PC (Ethernet connection) Access the controller from the PC's web browser, thus enabling system configuration.	☐
8. Rectifiers' load current sharing; verify. (Using the keypad on the controller or from the PC) Check all rectifiers output the same amount of current (± 1A)	☐
9. Display the stored log of Alarm Messages. Using the keypad on the controller or from the PC.	☐

System Adjustment — Power is ON!

CARRY OUT THE FOLLOWING:	OK
1. DC Output Voltage Calibration; ensure correct display readings. If measured DC output voltage at the load terminals deviates more than ± 1A from the display reading, calibrate the output voltage from the controller's keypad or the PC.	☐
2. Load and Battery Current Calibration; verify correct display readings. Measure with a clip-on ammeter the battery current and every load circuit current. Calculate the total load and battery current. If the calculated total values deviate more than ± 2% from the display readings, calibrate the current from the PC (calibration value >50% of system's max. capacity).	☐
3. DC Output Voltage Adjustment; measure and adjust. Measure and, if required, adjust the output voltage to the nominal voltage recommended by the battery manufacturer. (Voltage measurements to be done at the DC rail, with little load current.)	☐
4. Alarm Relay Test; verify all alarms are working correctly From the controller's keypad or PC use the Relay Test function; verify activation of external equipment.	☐
5. Battery bank control; measure and verify battery specification. Follow the recommendations of the actual battery manufacturer.	☐

Approval

Responsible of commissioning, sign	*Date*	*Approved by customer, sign*

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

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