

Installation Guide

Modular with Smartpack Touch



Flatpack2 DC Power System

Delta Part No. 5017197602

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Published August 2019

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Safety Practices and Compliance

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 ($\pm 10\%$), 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 and converters deployed) at an ambient operating temperature range of -40°C to $+45^{\circ}\text{C}$. Systems are powered by Flatpack2 HE rectifiers and available for 48V DC output. (Flatpack2 3kW rectifiers 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). Do not disconnect and reconnect I/O power connectors during lightning storms. Equipment is intended for deployments where an external Surge Protective Device (SPD) is utilized. 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.



WARNING: This product is intended to be protected by a surge protector that meets the applicable criteria or GR-974-CORE. Failure to utilize the appropriate surge protector could result in susceptibility to lightning surges or create a potential hazard due to power faults.



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

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

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

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) 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.

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.

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 Table 6.

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.



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 source might be present. Improper connection may cause damage or serious injury. Ensure that the power 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 source. 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. 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 FCC compliance.

Power System Mounting and Wiring

Before installing the power system, note the following safety requirements:

- **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 (T_{ma}) 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.
- **Mechanical Loading:** Mounting of the equipment in the rack should be such that a hazardous condition does not exist 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 overcurrent 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).

1. Product Specifications

Engineering specifications for the different items within the Modular HE System are covered in the following topics;

- Overview (next section)
- References, page 12
- System Specifications, page 13
- AC Input Specifications, page 13
- Rectifier Specifications, page 17
- DC Output Specifications, page 19
- LVDB Option, page 29
- Battery Connections, page 29
- Bulk DC Connections, page 29
- CO Ground, page 30
- Controller Specifications, page 31
- Additional Product Specifications, page 35

Overview

The Modular system is a rack-mounted, self-contained DC power plant, with circuit and battery protection. It consists of a combination of the following components:

- AC junction box
- Distribution panels, which may include:
 - 26-position circuit breaker panel
 - High-capacity circuit breaker and/or fuse panel(s)
 - Battery bus (with shunt)
- Smartpack2 control and monitoring system
- Rectifier shelves
- LVDB (optional)

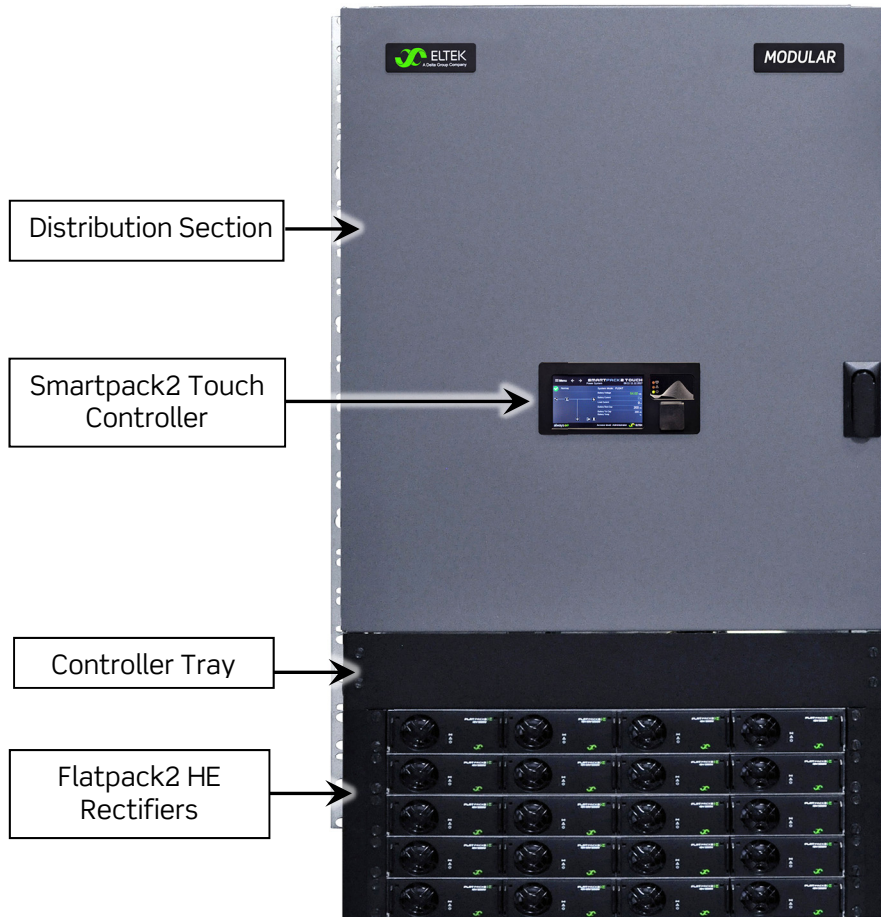


Figure 1 - Modular -48V, 1200A System

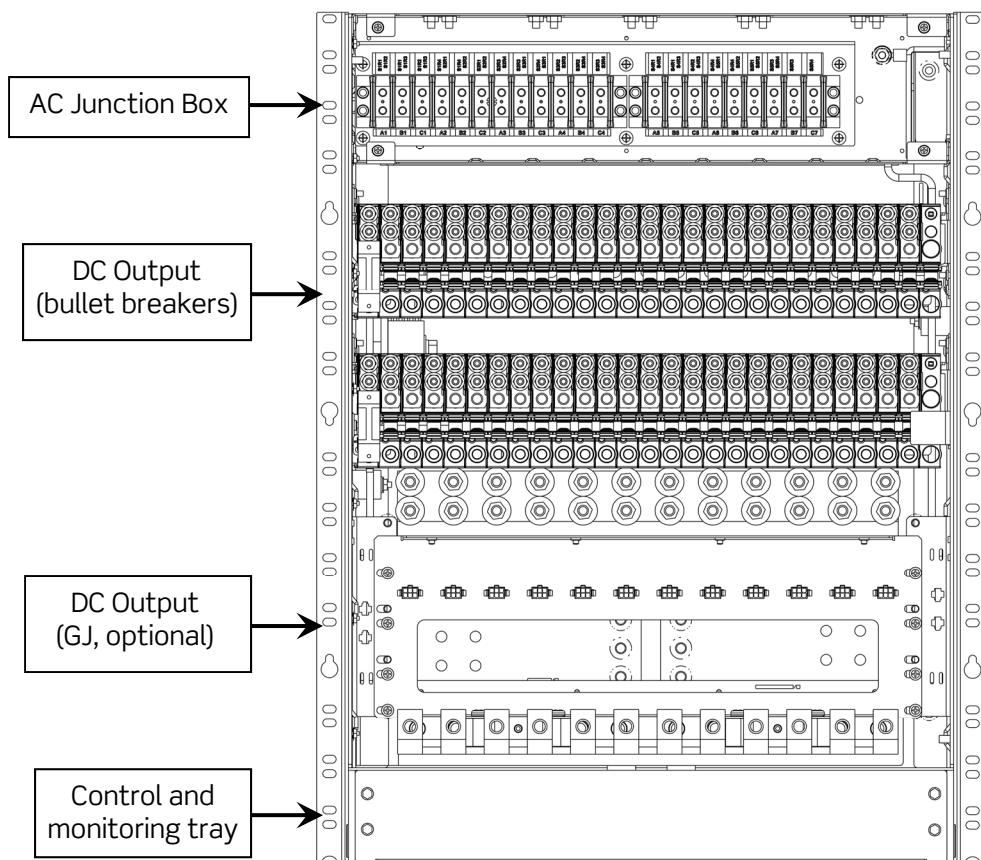


Figure 2 - Modular with Distribution Door Open (sample configuration)

References

This manual provides an overview of and installation guidelines for Modular power systems. Additional information regarding system components is found in the following documents:

- *Modular HE Product Guide*, Doc. No. EDM0000215199
- *Datasheet: Modular HE*. No. 370001.DS3
- *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063
- *The printed copy of the parameters that shipped with your system*
- *Smartpack2 Touch Ports and Navigation*, Doc. No. 370135.033
- *User Guide: Eltek Controller Web Interface*, Doc. No. 370035.013

Additional product information is available online at eltek.sharefile.com.

System Specifications

The Modular product line has a range of options for distribution and AC input, as well as an optional LVDB. For details on various system configurations, see the *Modular HE Product Guide*, Doc. No. EDM0000215199, available at eltek.sharefile.com.

To identify the characteristics of your system, find the product label on the right side of the distribution panel (viewed from the front) that matches the following format. The product code indicates the various options for your system, as illustrated in the following figure.

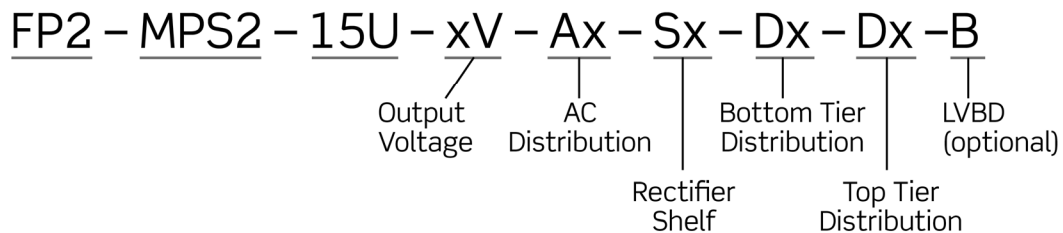


Figure 3 – Modular Product Code

Using the product code, and the corresponding tables, you can quickly verify the key features of your system

- Output Voltage – output current rating. All Modular systems are –48V (see “DC Output Specifications,” page 19).
- AC Distribution – single- or three-phase, input style, voltage (see “AC Input Specifications, page 13).
- Rectifier Shelf – Flatpack 2 rectifier shelves (see “Rectifier Specifications,” page 17, for more details).
- Bottom Tier Distribution – distribution capacity, fuse and breaker positions, landings for the top tier of the system (see “DC Output Specifications, page 19).
- Bottom Tier Distribution – distribution capacity, fuse and breaker positions, landings for the top tier of the system (see “DC Output Specifications, page 19).
- LVDB Option– internal return bus bar option (see “LVDB Option,” page 29).

AC Input Specifications

There are several AC input options in this system. To determine the specifications for your system, see the following table, in combination with the product code (illustrated in Figure 3, above).

Table 1 – AC Input Options

Group No.	Description	AC Input Style	AC Terminal Style	Ground Stud	AC Input Wire Size	AC Knockout
A1	Single-phase, 240 VAC or 277* VAC	Individual	Compression terminal block	Qty. 5 ¼" on ⅝" center	Max. 10 AWG	Qty. 6 φ1.35" knockout for 1" standard conduit
A3	Single-phase, 208 VAC or 277* VAC	Two rectifiers per feed	#10-32 screw (single-hole lug)	Qty. 5 ¼" on ⅝" center	Max. 6 AWG	Qty. 6 φ1.35" knockout for 1" standard conduit
A4	Three-phase (3W+PE) 208 VAC or 240 VAC	Three rectifiers per feed	#10-32 screw (single-hole lug)	Qty. 5 ¼" on ⅝" center	Max. 6 AWG	Qty. 6 φ1.35" knockout for 1" standard conduit

*Single-phase 277 VAC input only applies to Flatpack 2 48V/3kW rectifiers.

AC Input Junction Box

The AC junction box is located in the top front of the distribution section. There are six (6) knockouts on the top of the box for 1" conduit.

There are two styles of terminals available: compression screw and barrier strip. Compression are used for individual-feed. Barrier strip terminals to feed two or three rectifiers per feed.

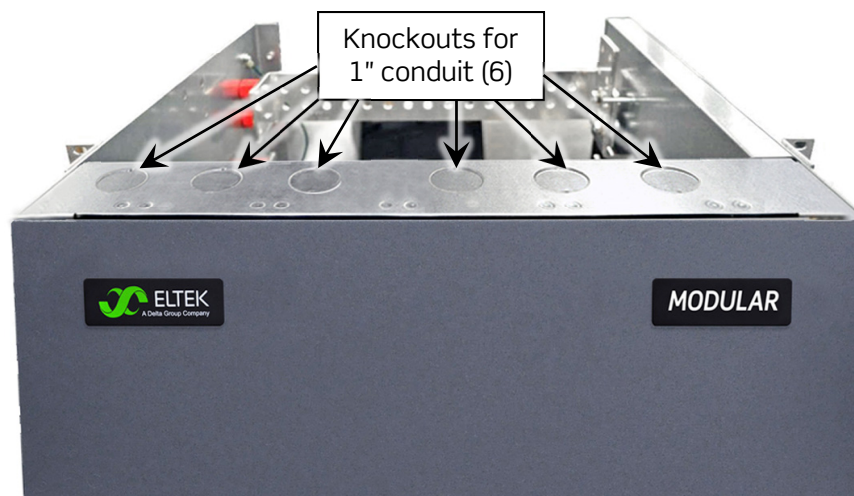


Figure 4 – AC Box Location and Conduit Knockouts

The AC input terminals are labeled numerically from left to right and assigned a rectifier slot. “R” means “rectifier”. Terminals are marked “L1” for “Line 1” and “L2/N” for “Line 2/Neutral”. Always make ground connections first.

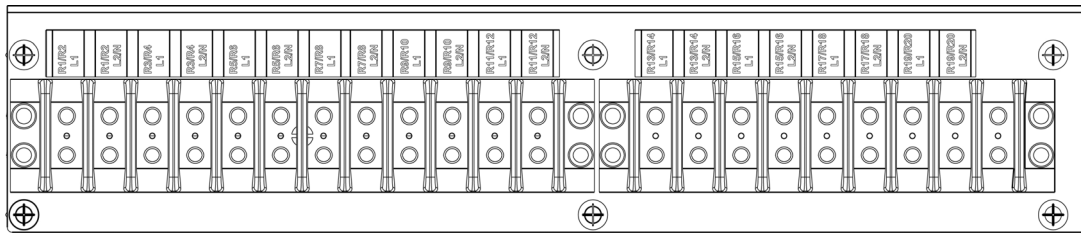


Figure 5 - AC Labels (Barrier Strip Terminals)

There are five sets of ¼”-20 studs on 5/8” centers provided inside the top of the junction box for ground connections. One- and two-hole lugs can be used. Ground leads must be longer than the power leads. **Always make ground connections first!**

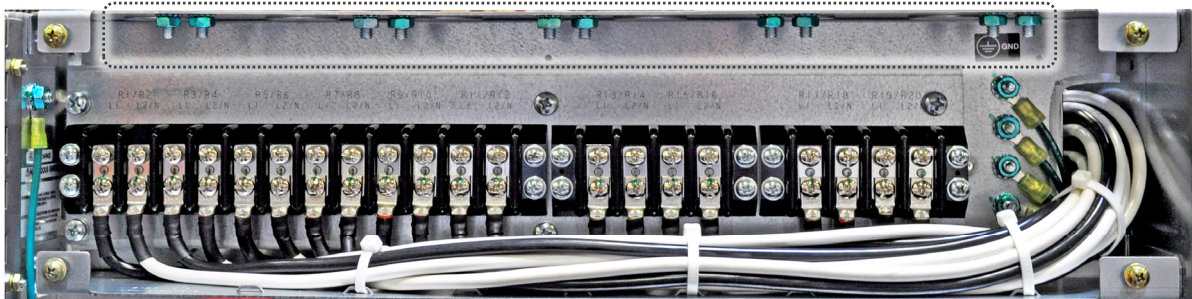


Figure 6 - AC Ground Connections

Figure 7 shows the location of the rectifier slots that correspond to the AC labels. Notice that the rectifier slots are numbered from top to bottom, left to right.

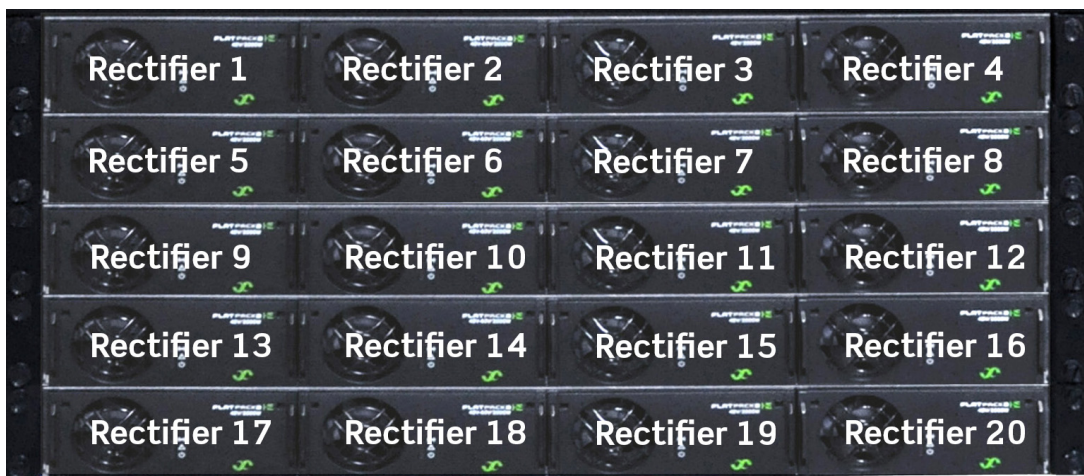


Figure 7 - Rectifier Slots (numerical order)

Compression Screw Terminals

Compression terminals are used for single-phase individual-feed input. There are five shelves (20 rectifiers total, see Figure 9).

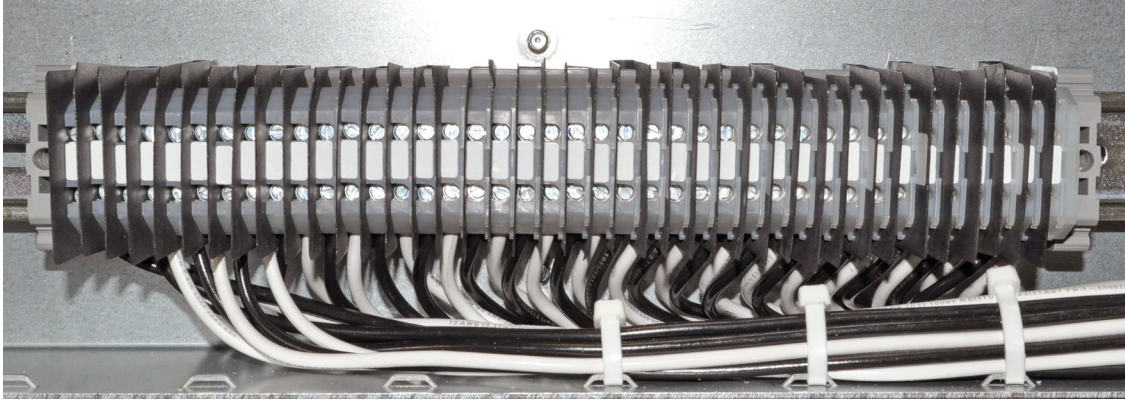


Figure 8 – Compression Screw Terminals

NOTE: In the figure below, "L2" corresponds to the "L2/N" label in the AC box (for "Line 2 or Neutral").

Individual-feed terminals accept a wire size of up to #10 AWG, depending on the current draw of the rectifier used; strip length is approximately 0.3" (8 mm); recommended torque range is 4.4 in-lbs. to 6.1 in-lbs. (0.5 N·m to 0.7 N·m). (Figure 9 below.)

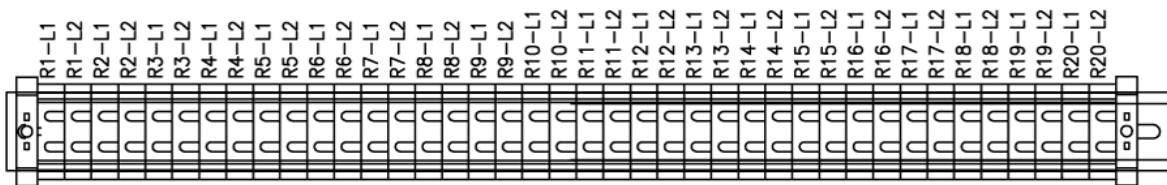


Figure 9 – Compression Screw Terminals (Individual-feed)

Barrier Strip Terminals

Barrier strip terminals are configured for two rectifiers per feed (single-phase), or three rectifiers per feed (three-phase). Use one-hole lugs for #10-32 screws (maximum width of 0.47")re recommended to connect cables to the barrier strip terminals. Recommended torque is 20 in-lbs (2.3 N·m).

NOTE: In the figures below, "L2" corresponds to the "L2/N" label in the AC box (for "Line 2 or Neutral").

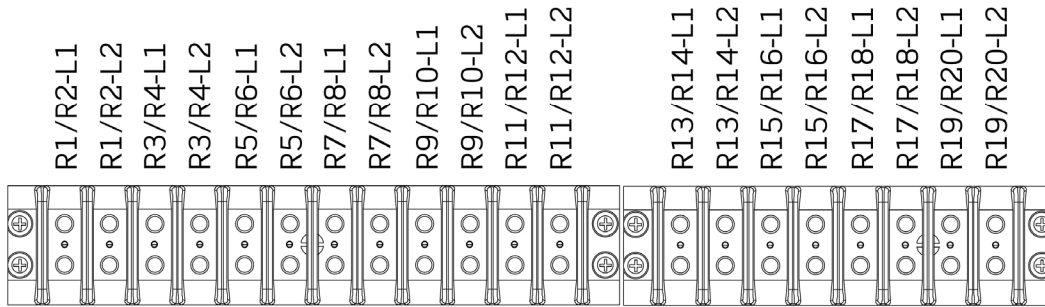


Figure 10 - Barrier Strip Terminals (Dual-feed)

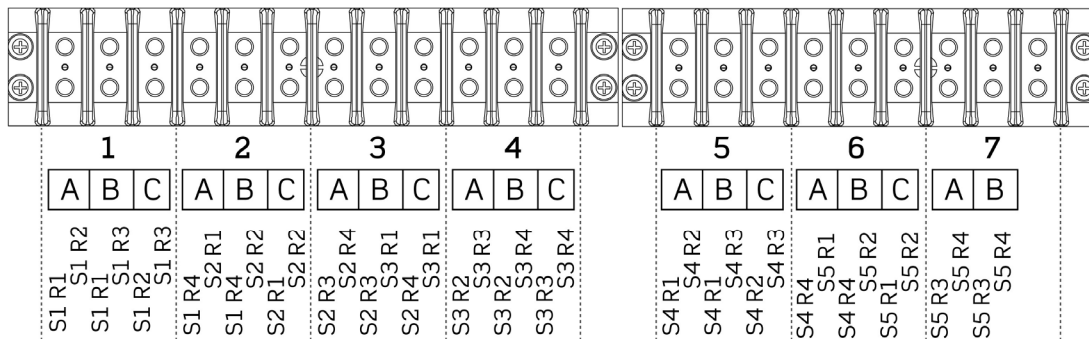


Figure 11 - Barrier Strip Terminals (Three-phase)

Rectifier Specifications

Modular Systems use Flatpack2 rectifier modules. Each system had five shelves, and each shelf has four rectifier positions, for a total of 20 positions. Specifications for the rectifiers are listed in Table 2.



Figure 12 - Flatpack2 Rectifier

Table 2 – Rectifier Specifications

Part No.	Nominal DC Voltage (V DC)	DC Output Voltage (V DC Range)	Max DC Output Current (A)	Maximum DC Output Power (W)	Rated Input Voltage (V)	Operational Input Voltage (V)
241115.105.VC	48	43.5 – 57.6	41.7	2000	100 – 250	185 – 300 (full power) 85 – 185 (de-rated)
241119.105.VC	48	43.5 – 57.6	62.5	3000	100 – 277	176 – 305 (full power) 85 – 176 (de-rated)

Table 3 – Rectifier Temperature De-Rating

Rectifier	Output Power		
	45°C	55°C	65°C
241115.105.VC 48V/2000W	2000W	1783W	1567W
241119.105.VC 48V/3000W	3000W	2721W	2410W

Assumes Nominal Input

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

NOTE: Values listed in the table are per rectifier rather than the sum of a fully-populated shelf.

Table 4 – Heat Dissipation

Part No.	Typical load (50%) at nominal input	Maximum load (100%) at nominal input
	BTU/hr	BTU/hr
241115.105.VC 48V/2000W	138	366
241119.105.VC 48V/3000W	234	637

Assumes Nominal Input

DC Output Specifications

All Modular systems have an output of –48 VDC, and a maximum capacity of 1200 A.

Modular systems feature two distribution tiers that can be configured for a variety of distribution panels. Two types of configurable distribution panels are available:

- GJ Panel (GJ/GS-style Breaker and TPL-style Fuse Adapter), page 21.
- Plug-in Board (Bullet-style Breakers/Fuse Adapters), page 23.
Boards are for bullet-style circuit breakers and fuse adapters.

Configuration options are listed in the following table.

Table 5 – Distribution Options

Group No.	Description	Load Breakers/ Fuses and Landings	Load/Shunt Monitoring	Bulk Landings (Hot & Return)
D0-D0	Bulk output distribution (no load distribution)	N/A	N/A	Qty. 2 or 4 (back-to-back) 3/8" on 1" center
D3S-D0	Bottom tier distribution, no top tier distribution; (12 GPS or 6 TPL option) with 6 load shunt monitoring; for GS breaker, only odd positions (L-R) are monitored.	Qty. 12 (GJ/GS) or 6 (TPL) 3/8" on 1" center	Qty. 6 GS or TPL	Qty. 2 3/8" on 1" center
D3S-D3S	Bottom tier distribution (12 GPS or 6 TPL option) with 6 load shunt monitoring; for GS breaker, only odd positions (L-R) are monitored. Top tier distribution (12 GPS or 6 TPL option) with 6 load shunt monitoring; for GS breaker, only odd positions (L-R) are monitored.	Qty. 24 (GJ/GS) or 12 (TPL) 3/8" on 1" center	Qty. 12 GS or TPL	Qty. 2 3/8" on 1" center
D3S-D5	Bottom tier distribution (12 GPS or 6 TPL option) with 6 load shunt monitoring; for GS breaker, only odd positions (L-R) are monitored. Top tier distribution: two plug-in boards, with 52 bullet breaker positions	Qty. 12 (GJ/GS) or 6 (TPL) 3/8" on 1" center Qty 52 (Bullet breaker) 1/4" on 5/8" center	Qty. 6 GS or TPL	Qty. 2 3/8" on 1" center
D3S-D9	Bottom tier distribution (12 GPS or 6 TPL option) with 6 load shunt monitoring; for GS breaker, only odd positions (L-R) are monitored. Top tier distribution (one plug-in board) with 26 bullet breaker positions	Qty. 12 (GJ/GS) or 6 (TPL) 3/8" on 1" center Qty 26 (Bullet breaker) 1/4" on 5/8" center	Qty. 6 GS or TPL	Qty. 2 3/8" on 1" center
D5-D0	Bottom tier distribution, no top tier distribution: two plug-in boards, with 52 bullet breaker positions	Qty 52 (Bullet breaker) 1/4" on 5/8" center	No	Qty. 2 3/8" on 1" center
D5-D9	Bottom tier distribution: two plug-in boards, with 52 bullet breaker positions Top tier distribution (one plug-in board) with 26 bullet breaker positions	Qty 78 (Bullet breaker) 1/4" on 5/8" center	No	Qty. 2 3/8" on 1" center

All systems include 14 battery bulk landings (3/8" on 1" center), and 50 mV/2000 A battery shunt. LVBD is optional (see "LVDB Option," page 29).

GJ Panel (GJ/GS-style Breaker and TPL-style Fuse Adapter)

GJ panels are designed for larger load applications and have a single output bus. All MDG panel configurations are rated at 1200A. There are twelve (12) mounting positions. Panel configuration is based on the style of current protection desired. Components for each configuration (e.g., protection devices, adapter plates, shunt monitors) are installed at the factory. A Load Monitor unit is provided when shunts are installed (see Figure 30 on page 34).

Breakers and fuse assemblies require different panel configurations, as explained below. If an unprotected output position is desired (e.g., for a battery string), a bulk output plate with shunt (GS0000) can be installed.

NOTE: Output cable landings accommodate double-hole, narrow-tongue lugs for wire sizes up to 350MCM. Landing stud sets are 1.5" apart side to side.

NOTE: Up to eight (8) shunts can be monitored in one GJ panel, since there are eight (8) shunt sensing connectors on the backplane of the GJ panel. For alarm monitoring, up to twelve devices can be monitored.

By default, the factory load-monitoring positions are every odd position from 1 through 9 (1, 3, 5, etc.) and 10, 11, and 12.

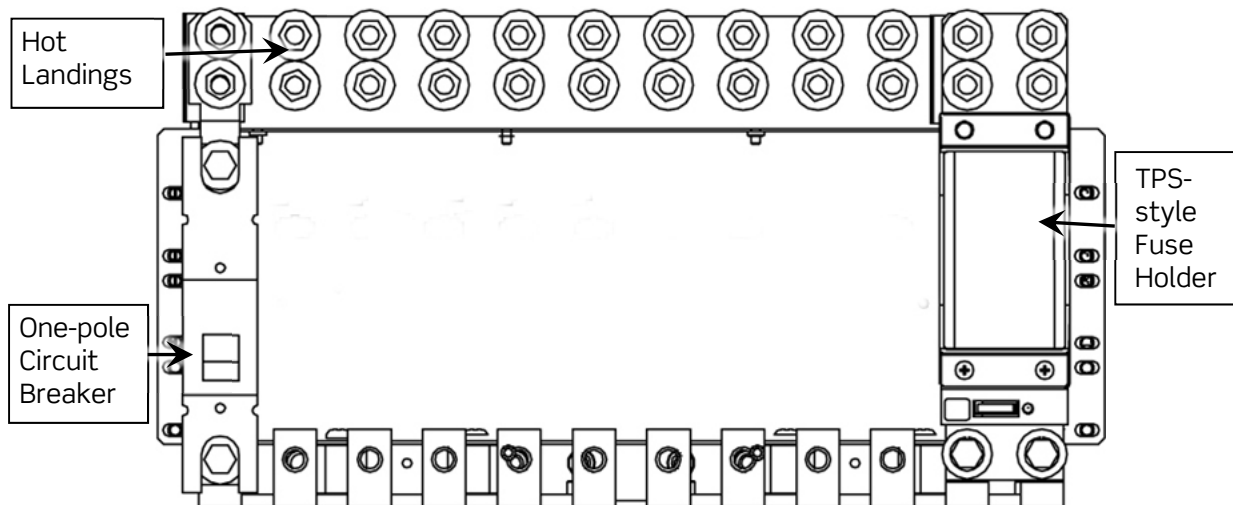


Figure 13 – GJ Panel for GJ/GS-Style Circuit Breakers and TPL-Style Fuses

For return connections, one return bus similar to battery connection bars is provided – regardless of whether there are one or two GJ panels. The return bus for GJ panels is located above the battery buses. See Figure 14.

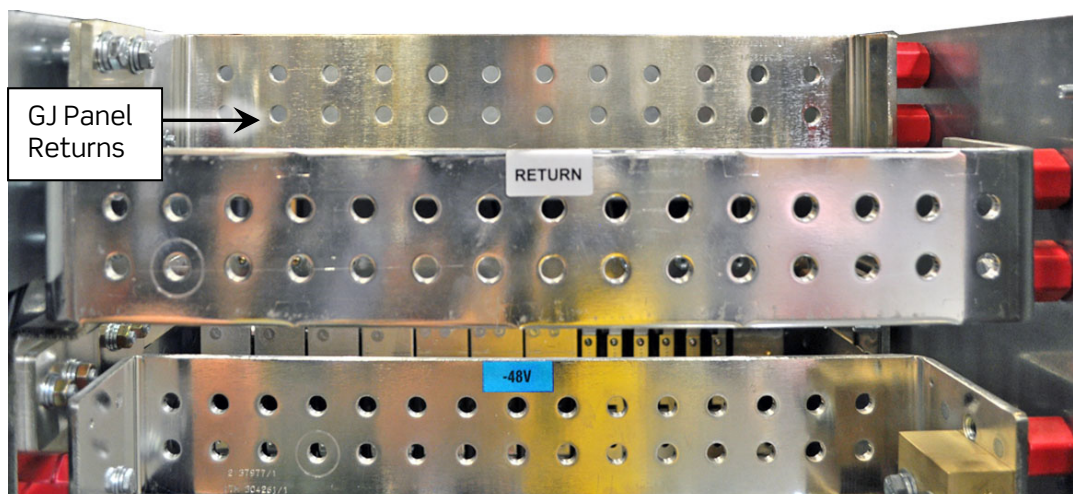


Figure 14 – GJ Panel Return Connections (view from rear of distribution section)

GJ/GS Breaker Configuration

GJ-style breakers have no shunt. A GJ-style breaker with shunt monitoring is designated as a “GS”-style breaker. Shunted breakers (GS) require a monitor cable, which is provided. GJ and GS breaker panel assemblies are available in three (3) styles: one-pole, two-pole and three-pole. Each comes with an adapter plate that connects to the breaker and provides cable landing positions. Adapter plate cable landings have double 3/8” studs with 1” centers that accommodate one 350MCM narrow-tongue lug per contact point.

One-pole breakers take one (1) mounting position and are available in current ratings between 100 – 250A. Two-pole breakers take two (2) mounting positions and are available in current ratings between 275 – 400A. Three-pole breakers take three (3) mounting positions and are available in current ratings between 450 – 600A.

All connections are double 3/8” studs with 1” centers and should be torqued according to the specifications in Table 6 on page 37. Adapter kits include bus bar assemblies, mounting hardware, and alarm/signal cables.

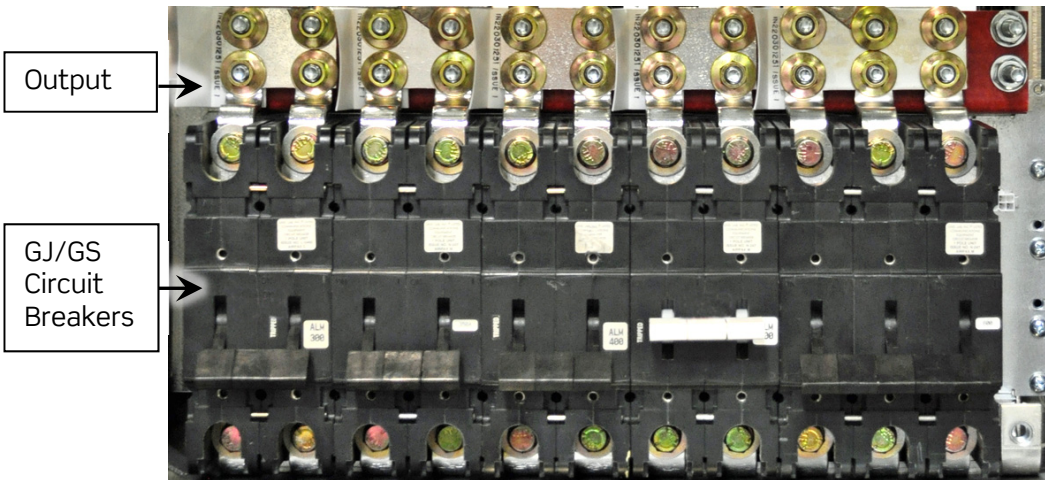


Figure 15 – GJ Panel with GJ/GS-style Breakers

TPL-style Fuse Configuration

TPL-style fuse assemblies (MTPLHS) take up two (2) mounting positions, yielding a total of six (6) fuse assemblies in this configuration. Two (2) sets of double 3/8" studs with 1" centers are provided for each fuse output landing; connections should be torqued according to the specifications in Table 6 on page 37. Fuses come with a puller, but are sold separately from the fuse assembly.

Fuse assemblies are factory-installed and include a 0.18A GMT indicator fuse for alarm purposes. In addition, fuse assemblies have a 600A, 20mV shunt for monitoring current.



Figure 16 – TPL-style Fuse

Plug-in Board (Bullet-style Breakers/Fuse Adapters)

Plug-in boards facilitate bullet-style plug-in circuit breakers and fuse adapters. Each board has 26 one-pole positions and is rated up to 600A. The boards can accommodate one-pole, two-pole, and three-pole circuit breakers (multi-pole breakers require adapter kits).

NOTE: Multi-pole adapter buses must be cabled before connecting to the panel.

Cable landings accept two-hole lugs with 1/4" holes on 5/8" centers for a maximum wire size of 2 AWG. Space is available for a maximum tongue width of 0.625". Fastening hardware is provided; torque according to the values found in Table 6 on page 37.

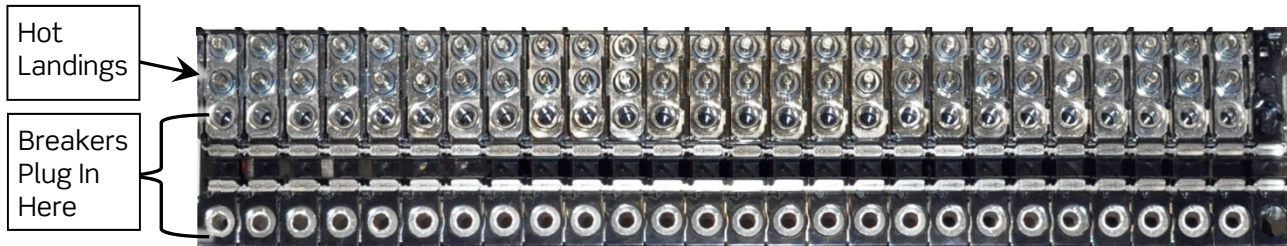


Figure 17 - Plug-in Breaker Board

If **two boards** are installed, there is one return bus structure with 24 landings on each sides and seven (7) along the sidewall (for a total of 55 cable landings).

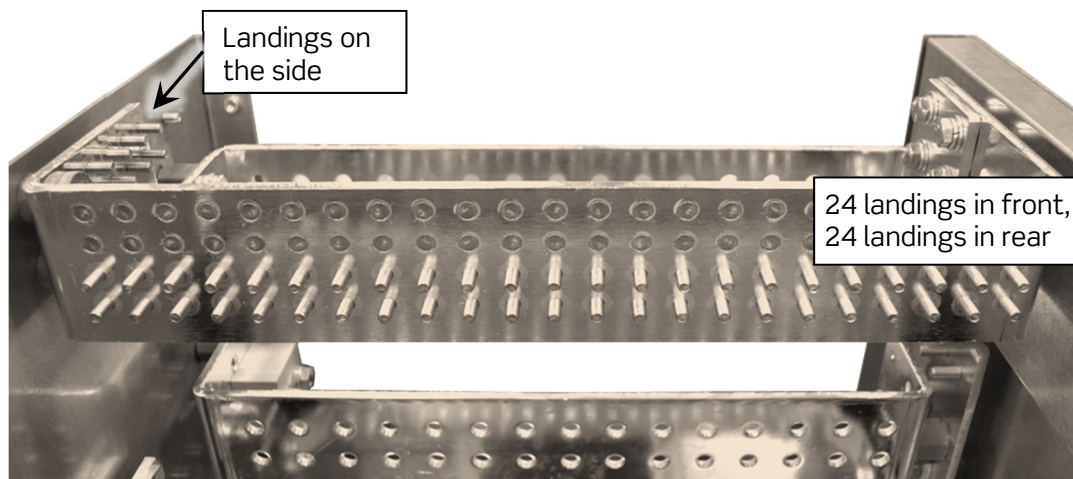


Figure 18 - Return Landings for 2 Plug-in Boards (50 positions)

If **three boards** are installed in a Modular system, then a 78-position return bus structure is also installed in the top of the distribution section (3 boards and 26 positions per board). The return bus structure consists of two bars, one of which has 24 landings on both sides and seven (7) along the sidewall; and the other bus has 23 landings on one side.

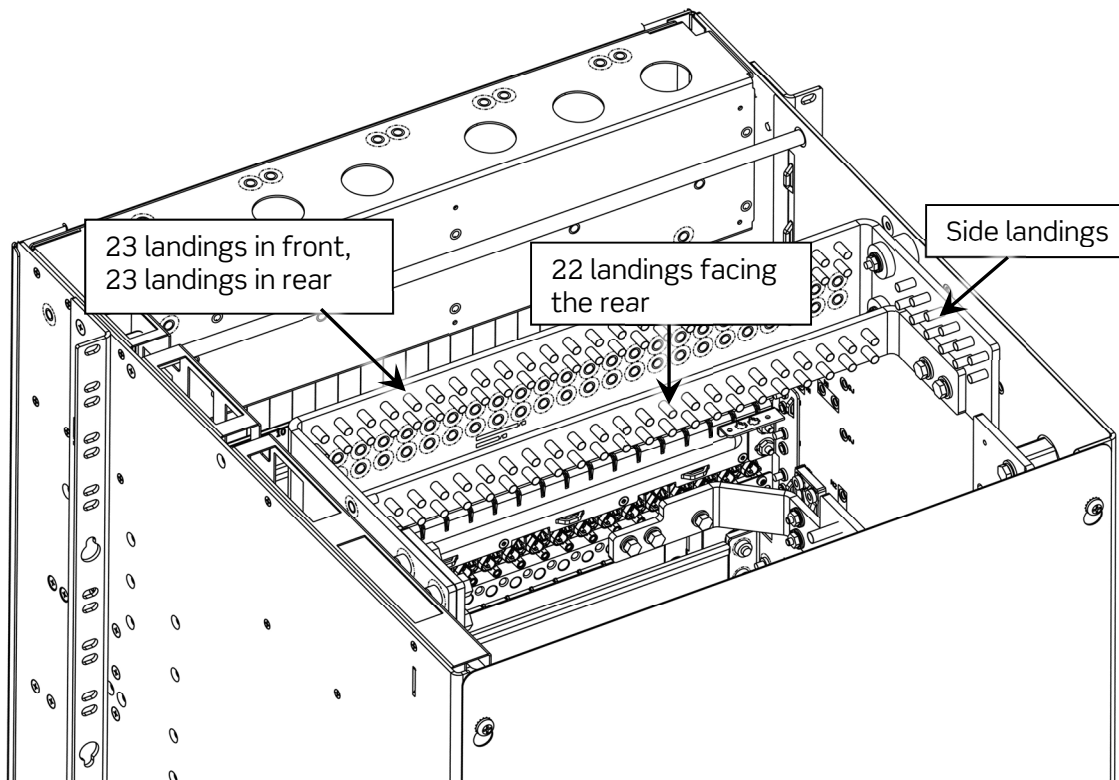


Figure 19 – Return Landings for 3 Plug-in Boards (72 positions)

Circuit Breakers and Fuses

Breaker and fuse options depend upon distribution panel specifications, as indicated by the product code (see Figure 3, on page 13) and the load distribution options (see Table 5, on page 20). Distributions with load fuse options require either TPL fuses or GS/GJ breakers.

Note: All breakers and fuses should be allowed to carry no more than 80% of the rated value.

Additional details about breakers and fuses are found in the following sections:

- Circuit Breakers (next section, below)
- Fuses (on page 27)
- Plug-in Fuse Holders (page 28)

Circuit Breakers

Refer to Table 5 (on page 20) for different load distribution options that use breakers.

Circuit breakers (sold separately) are UL-listed bullet style and install into the breaker connection points. Follow national, local, and company codes for sizing and installation. Systems with circuit breakers require breakers with dry alarm contacts that create a short circuit between the NC (normally closed) and C (common) connections in a tripped state.

Breakers may include the following.

Bullet Breakers

Note: Leave one position open between breakers of more than 70 amps.

**Electro Mechanical; alarm when manually switched OFF,
OR Mid-Trip; NO alarm when manually switched OFF**

- Single Pole Breakers, 5 – 100A, 1/4"-20 x 5/8"
- Double Pole Breakers, 125A – 200A; with bus strap, 5/16" stud on 1" center
- Triple Pole Breakers, 250A; with bus strap, 3/8" stud on 1" center



Figure 20 – Bullet Circuit Breaker

GJ/GS Breakers

Note: GJ/GS breakers 500A and above must be spaced with at least one open position between breakers.

- **GJ, Mid-Trip**
 - Single Pole Breakers, 100 – 250A
 - Double Pole Breakers, 300A – 450A

- Triple Pole Breakers, 450A – 600A
- Five Pole Breakers, 1000A
- **GS, Mid-Trip, with Shunt**
 - Single Pole Breakers, 100 – 250A
 - Double Pole Breakers, 300A – 450A
 - Triple Pole Breakers, 450A – 600A
 - Five Pole Breakers, 1000A
- **GJ, Electrical Trip**
 - Single Pole Breakers, 100 – 250A
 - Double Pole Breakers, 300A – 450A

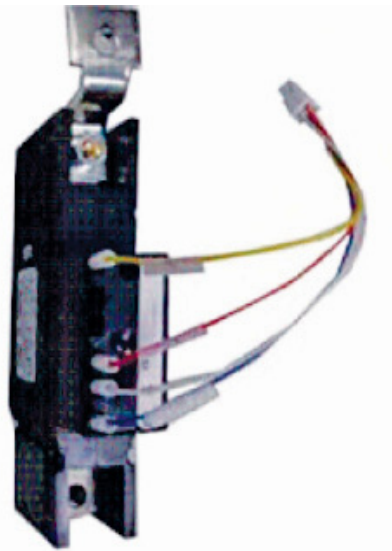


Figure 21 – GJ Breaker Assembly

Fuses

Refer to Table 5 (on page 20) for different load distribution options that use fuses.

TPL fuses, for applicable systems, are rated from 70A – 800A. Each TPL fuse requires one fuse base and one fuse puller. Fuse bases are available to occupy two or three landing positions.

Note: Leave one position open between fuses of more than 70 amps.

Note: 800A fuses (at 80% load) must be used only at a system ambient temperature of 25°C or lower.

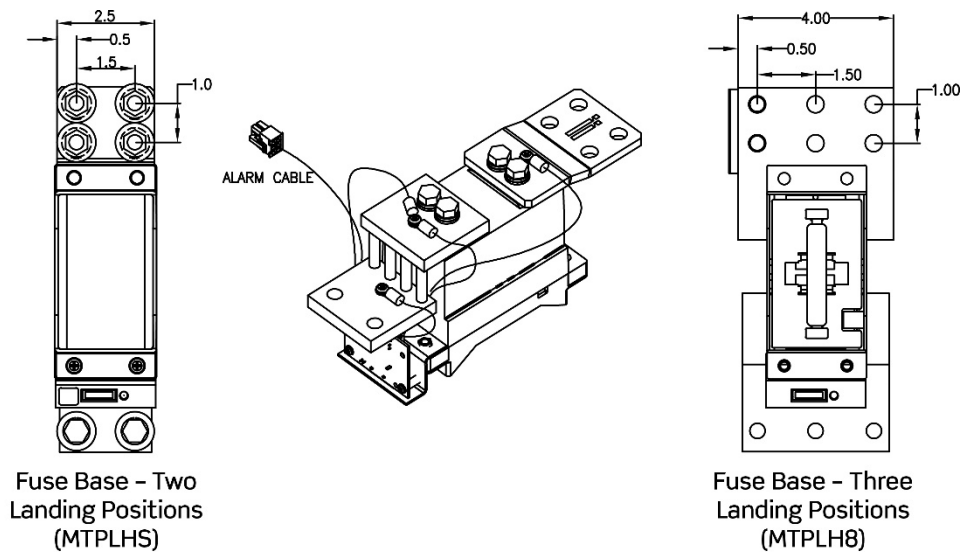


Figure 22 - TPL Fuse Bases

Plug-in Fuse Holders

Plug-in fuse modules (TLS/TPS) may be used in place of single-pole bullet breakers. For breaker information, refer to the preceding section, “Circuit Breakers and Fuses,” on page 25.

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 fault condition. 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 alarm fuse.

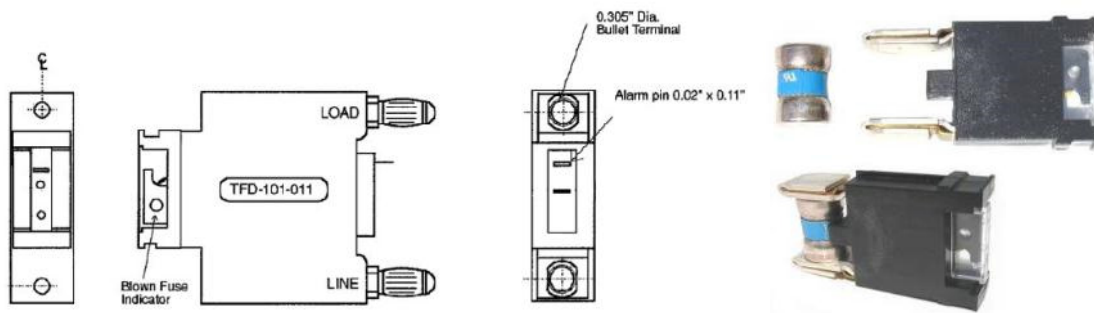


Figure 23 - Fuse Modules

LVDB Option

A 1200A Low-Voltage Battery (LVBD) contactor is available as an option for Modular Systems. If this option is present, the character “B” appears as the last character in the product code (see Figure 3, page 13). Contactor settings are configured through the Smartpack2 controller.

Battery Connections

The rear of the distribution section contains battery connections. 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.

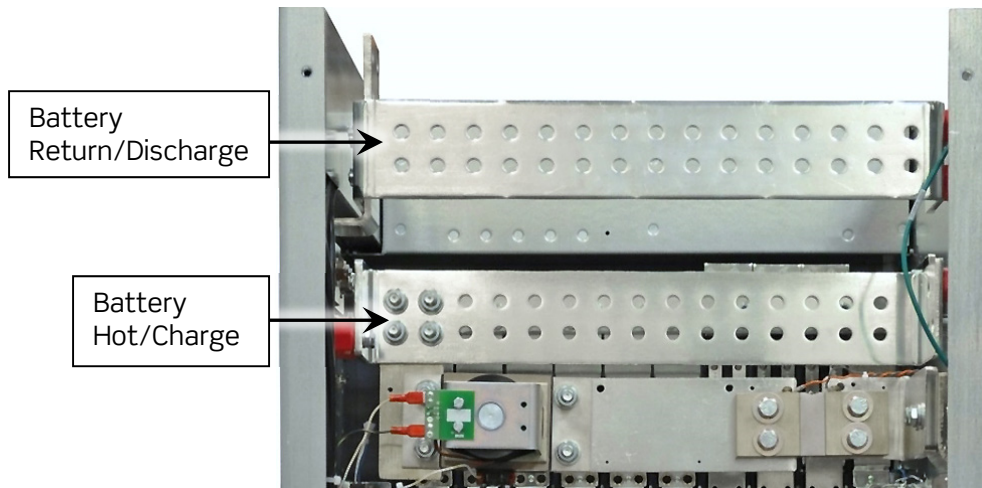


Figure 24 - Battery Connections

Bulk DC Connections

The rear of the distribution section contains bulk connections, near the bottom. There are two (2) landings per polarity. Each landing consists of two 3/8” studs with 1” spacing.

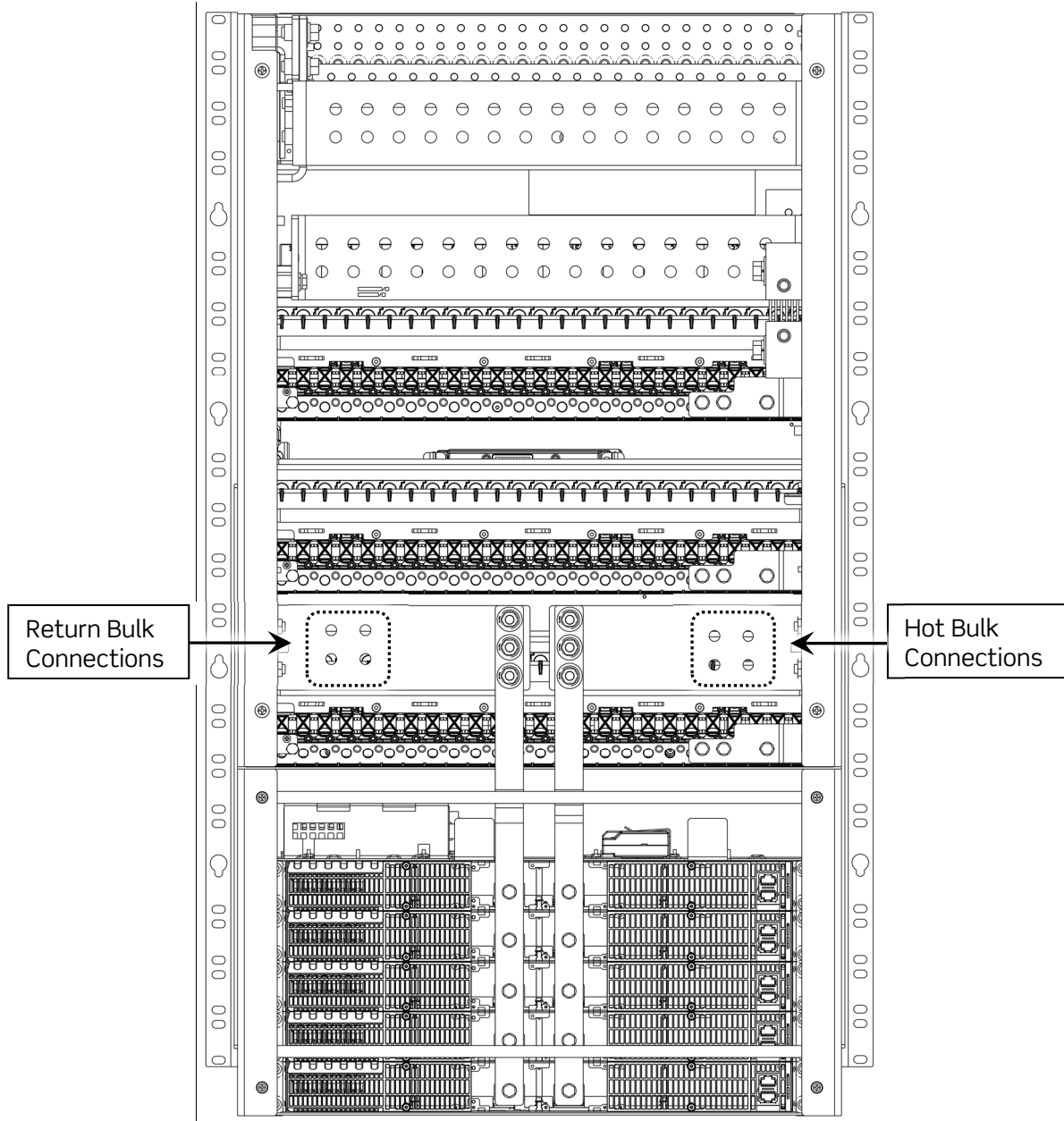


Figure 25 - Bulk Connections

CO Ground

One ground connection to the return bus is recommended. The connection should be made with cable at least the size of the largest connected power cable.

Controller Specifications

The control system consists of the following components:

- Smartpack2 Touch Controller (next section, below)
- Smartpack2 Basic Industrial Controller (see page 32)
- I/O Monitor2 Alarm Monitors (see page 33)
- Load Monitor (optional configurations only) (see page 33)

Smartpack2 Touch Controller

The Smartpack2 Touch controller is the primary control unit. It is mounted on the door of the Modular system. The controller includes a color touch screen, as well as USB ports, Ethernet ports, and ports for connecting additional devices. From the touch screen, most system status information and parameters can be viewed and modified.

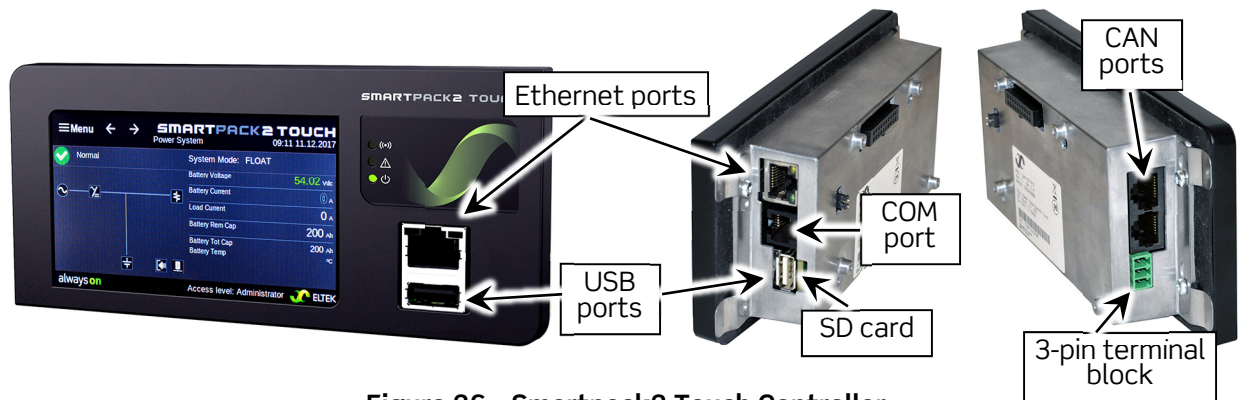


Figure 26 - Smartpack2 Touch Controller

An Ethernet port for LAN connection is provided on the front of the controller, along with a USB (2.0) host port.

Additional ports are located on the sides of the controller (behind the front door), Figure 26, above. These ports include:

- Side Ethernet port – for permanent connection to a LAN.
- Com port – RS-232 or RS-485 (Modbus)
- SD card port – For Micro Data Card
- Side USB port – USB 2.0 host port
- CAN ports – for connections to other controller modules: devices that extend controller monitoring. These devices include a battery monitor unit, I/O alarm monitor, load monitor, and CAN power device (each sold separately). Please

refer to the documentation provided with each additional device for installation instructions. If the CAN port is not used, the provided CAN termination plug must remain in place.

- 3-pin terminal block – for CAN communication to third-party equipment.

For additional information regarding the ports on the controller, see *Smartpack2 Touch Controller: Ports and Navigation*, Doc. No. 370135.033.

Configurable parameters can be changed from the screen, or using the web browser interface. For additional information, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063.

Smartpack2 Basic Industrial Controller

The Smartpack2 Basic Industrial Controller is the unit that monitors and controls the power system's internal functions and supplies power for connected CAN nodes. LVD and Sense inputs to this unit are internal only and terminated by the factory.

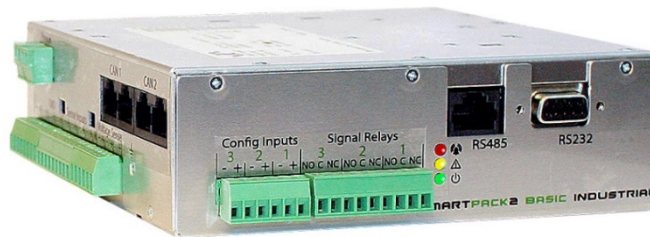


Figure 27 – Smartpack2 Basic Industrial Controller

Customer inputs to the Basic Industrial Controller include the following:

- 3 configurable inputs for temperature/voltage/current measurements
 - NO/NC, Pull Up/Down, Diode Matrix: –10V to +10V (2mV full range)
 - Current measurements: 4 – 20 mA (external sense resistor 100 – 500 Ω)
 - Temperature measurements: NTC probe
- 2 relay outputs (#2 and #3) – 0-220V, 30W (max. 1A), configurable
- RS-232C and RS-45 ports for serial communication

Maximum wire size for input/output connections is 16 AWG (1.5 mm²). Maximum current consumption is 1.6A. See the section, “Alarm Connections” (page 48) for installation details, including default output relay alarm assignments.

I/O Monitor2 Alarm Monitors

Customer connections for the I/O Monitor2 Monitor include the following:

- 6 configurable inputs for voltage/current measurement
 - NO/NC, Pull Up/Down, Diode Matrix
 - Voltage range, 0 – 75V (78 mV res)
- 6 configurable relay outputs
 - Normally activated/deactivated
 - Dry/Form C, max. 1A/60W/75V

Maximum wire size for input/output connections is 16 AWG (1.5 mm²). Maximum CAN power consumption is 3.4W. See the section, “Alarm Connections” (page 4848) for installation details, and for default output relay alarm assignments.

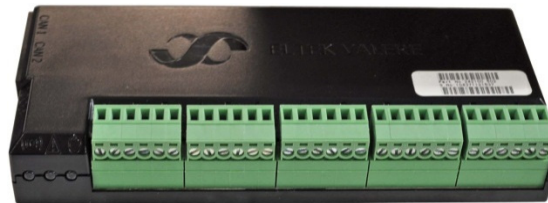


Figure 28 - I/O Monitor2

Load Monitor (optional configurations only)

For configurations with high capacity distribution panels, a load monitor is supplied with each panel. Each load monitor provides six programmable shunt inputs to monitor the shunts of GS-style breakers or TPL-style fuses on a 12-position breaker and fuse panel. There is a limit of eight shunts that can be monitored per panel. Connections are pre-wired at the factory.



Figure 29 - Load Monitor

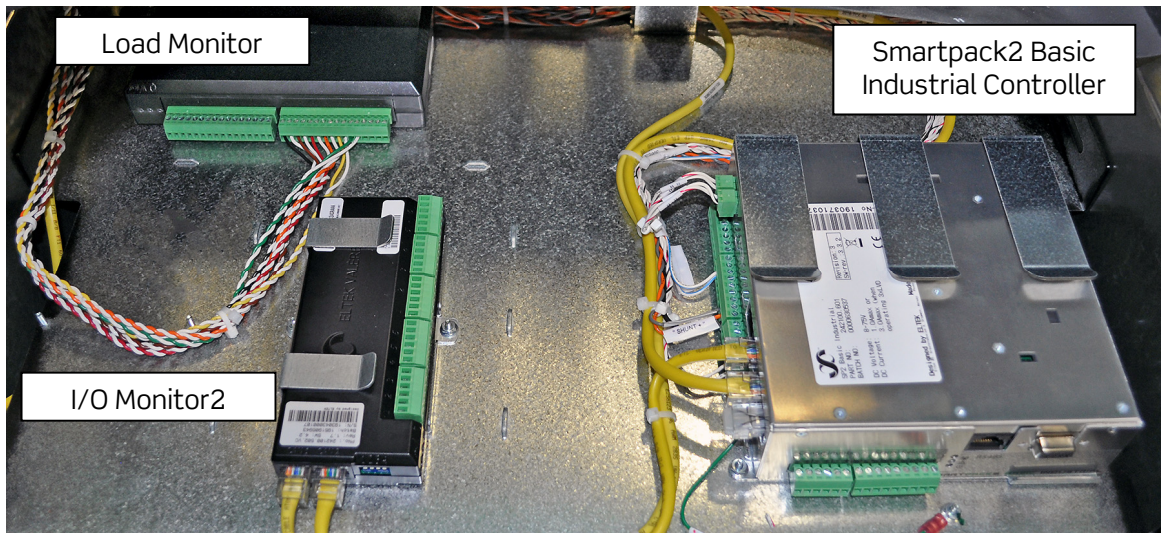


Figure 30 - Control and Monitoring Tray

Alarm connections are made to the I/O Monitor2 unit. Maximum wire size is 16 AWG (1.5 mm²), strip length is 1/4". Torque each connection to 3 in-lb. (0.2 N·m). There are six input alarms and six output relays.

The control and monitoring tray can slide forward, providing easier maintenance. To slide the tray forward, first remove screws and faceplate, also verify that there are no tie-downs that will impede the movement of the tray.

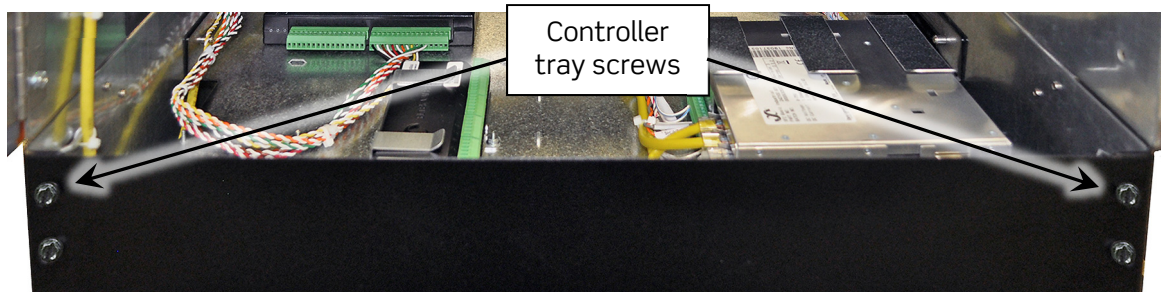


Figure 31 - Removal of Controller Tray Screws

Additional Product Specifications

Maximum height is 38.41 inches (932.90 mm); overall system depth is 22.47 inches (571 mm). It is designed for standard 23" wide telecommunications equipment racks.

Front clearance is required for door (24" recommended). Cable egress is from top / rear. Vertical clearance required; dependent on load cable size.

System weight, excluding rectifiers and rack, is approximately 225 lbs. (102 kg.), depending on distribution panels. Rectifiers add approximately 4.3 lbs. each.

2. Installation



WARNING: The system is to be mounted over a non-combustible surface only and installed in Restricted Access Locations (RAL). Access must be limited by use of tool, e.g. lock and key.

NOTE: Use of fully insulated tools is required when working with any powered AC or DC circuits.

Recommended Tools

The following tools are recommended for 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)
- Multimeter

Torque Settings

Table 6 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 6 – Recommended Torque Settings (in-lbs)

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

Unpack the System

A Modular unit is typically pre-installed in a cabinet or rack, 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.

Mount the System

When mounting a Modular system, follow the instructions given in the following sections.

- Location (next section, below)
- Rack Installation, page 38
- Rack Mounting, page 38

Location

Eltek recommends mounting the system on a floor made of a non-combustible material and of sufficient strength to withstand an earthquake. There should be adequate clearance above the system for the AC feeds, as well as adequate free space in front of and behind the rack for air flow.

Rack Installation

Concrete expansion anchors should meet the following requirements:

- A maximum embedment depth of 90 mm (3.5")
- A maximum bolt diameter of 13 mm (0.5")
- Use steel construction
- Be suitable for all earthquake zones

To install the rack:

1. Inspect the floor for compliance.
2. Drill holes 5/8" in diameter.
3. Place anchors into holes.
4. Place the rack over the anchors.

Rack Mounting

CAUTION: Never install a power system without capable assistance. Use capable assistance when lifting and mounting the system.

If the Modular system is ordered without a rack or enclosure, use the following instructions for rack installation:

1. Use proper lifting equipment to position the Modular system so that the holes in the support bracket are aligned with the correct mounting holes in the rack.
2. Use #12-24 screws to mount the system and tighten according to the specifications given in Table 6 on page 37.

Ground the System

For electrical safety, it is required to connect the green wire **safety ground** to one of the available locations in the AC junction box.

For CO ground, use one of the positions on either the battery return bus or the bulk return bus.

Make AC Input Connections

Input connections are made to the junction box. There are six (6) knockouts on the box for 1" conduit. Ground terminals are next to the knockouts and consist of 1/4" on 5/8" studs for two-hole lugs. **Always make ground connections first!**

The rectifier numbers on the terminals are numbered 1-16 for four shelves and 1-20 for five shelves. Insert the rectifiers beginning with the bottom shelf and the leftmost slot. Shelves are numbered from left to right, bottom to top. Refer to Figure 7 on page 15 to identify which rectifier slots are powered by the input terminals.

Make sure to size AC wires according to the maximum input current indicated the following table.

Table 7 - Rectifier AC Input Current

Group	Description	Maximum AC Current (Amps)	Minimum Circuit Breaker
A1	Ind. Feed compression	19A	25
A3	Dual Feed lug	38A	50
A4	Three phase compression	32A	40 (3 phase)

AC connections are covered in the following sections.

- Individual Feed Terminals (next section, below)
- Dual-feed Terminals (page 40)
- Three-Phase Terminals (page 41)

Individual Feed Terminals

Individual-feed terminals (on compression terminal block) accept a **wire** range up to #10 AWG; strip length is approximately 0.3" (8 mm); recommended torque range is 4.4 in-lbs. to 6.1 in-lbs. (0.5 N·m to 0.7 N·m).

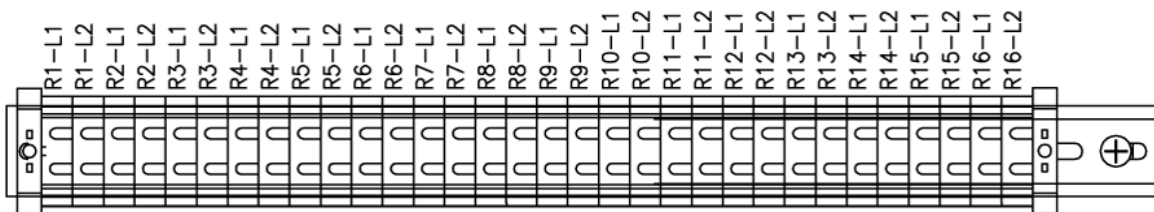


Figure 32 - Individual-feed, 4 Shelves (Compression Screw)

To terminate AC feeds to individual-feed compression screw terminals:

1. Remove the AC junction box cover.
2. Attach one-hole lugs for 1/4" studs to the ground wire of each AC feed and connect them to the 1/4" ground studs in the junction box (inside the top of box, in front of conduit knockouts).
3. Cut the AC lines of each feed shorter than their respective ground wires.
4. Beginning with the feed for R1, connect line 1 of the first AC feed to the terminal block labeled "L1", and connect line 2/neutral to the block labeled "L2/N".
5. Tighten each connection to the recommended torque range of 4.4 in-lbs. to 6.1 in-lbs. (0.5 N·m to 0.7 N·m).
6. Repeat in this manner for each remaining AC feed.

Dual-feed Terminals

Dual-feed terminals accept a wire size of up to #6 AWG, depending on the current draw of the rectifier used; strip length is approximately 0.4" (10 mm); recommended torque range is 13.3 in-lbs. to 16.0 in-lbs. (1.5 N·m to 1.8 N·m).

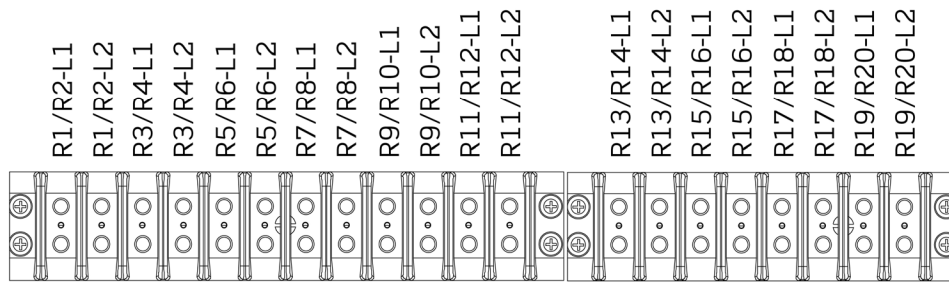


Figure 33 – Dual-feed, 4 Shelves (Barrier Strip)

To terminate AC feeds to dual-feed compression screw terminals:

1. Remove the AC junction box cover.
2. Attach one-hole lugs for 1/4" studs to the ground wire of each AC feed and connect them to the 1/4" ground studs in the junction box (inside the top of box, in front of conduit knockouts).
3. Cut the AC lines of each feed shorter than their respective ground wires.
4. Beginning with the feed for R1/R2, connect line 1 of the first AC feed to the terminal block labeled "L1", and connect line 2/neutral to the block labeled "L2/N".
5. Tighten each connection to the recommended torque range of 13.3 in-lbs. to 16.0 in-lbs. (1.5 N·m to 1.8 N·m).

- Repeat in this manner for each remaining AC feed.

Three-Phase Terminals

Three-phase terminals accept a wire size of up to #6 AWG, depending on the current draw of the rectifier used; strip length is approximately 0.4" (10 mm); recommended torque range is 13.3 in-lbs. to 16.0 in-lbs. (1.5 N·m to 1.8 N·m).

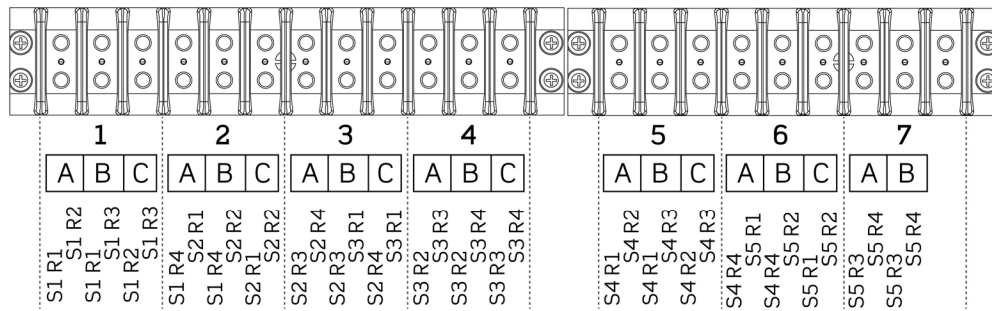


Figure 34 – Compression Screw Terminals (Three-Phase)

To terminate AC feeds to three-phase compression screw terminals:

- Remove the AC junction box cover.
- Attach one-hole lugs for 1/4" studs to the ground wire of each AC feed and connect them to the 1/4" ground studs in the junction box (inside the top of box, in front of conduit knockouts).
- Cut the AC lines of each feed shorter than their respective ground wires.
- Connect the Phase A line to terminal A of Input #1.
- Connect the Phase B line to terminal B of Input #1.
- Connect the Phase C line to terminal C of Input #1.
- Tighten each connection to the recommended torque range of 13.3 in-lbs. to 16.0 in-lbs. (1.5 N·m to 1.8 N·m).
- Repeat in this manner for each remaining AC feed.

Make DC Output Connections



WARNING: Shock hazard! Use insulated tools, especially when working on live systems.

CAUTION: Significant extraction force is required to remove distribution devices due to the contact pressure required for proper connections. Do not use any type of clamps, pliers, or similar tools as the housing can be cracked by excessive force.

Damaged devices represent an operational hazard and should never be used. Use the breaker extraction tool provided inside the distribution door.

NOTE: When installing distribution devices, make sure circuit breakers are in the OFF position, and do not install fuses until instructed to do so during system startup.

Distribution Panel



CAUTION: Circuit breakers should be in the “OFF” position when installed in the system.

To make distribution panel connections:

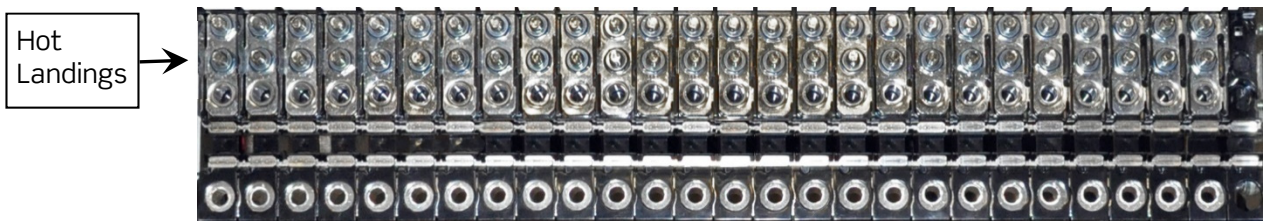


Figure 35 - Distribution Hot Connections

1. Make the corresponding cable (hot) connection above the device position (see Figure 35). Use ¼"-20 fastening hardware and torque according to the values found in Table 6 on page 37.
2. Plug in the over-current protection device (circuit breaker or fuse adapter) into the desired position. **Make sure the circuit is Off (O).**
3. Make connection to the corresponding breaker position in the same manner as the return position. For details on the variety of return connections available, see Figure 18 and Figure 19 beginning on page 24.

NOTE: A distribution with four plug-in boards does NOT include returns. The battery and bulk return buses are available as collection points.

4. Make a note for each position on the label provided on the distribution door.

NOTE: Do not close DC circuits until successful system turn-up.

GJ/GS Panel

GJ/GS breakers are installed at the factory.

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 according to the specifications given in Table 6 on page 37..

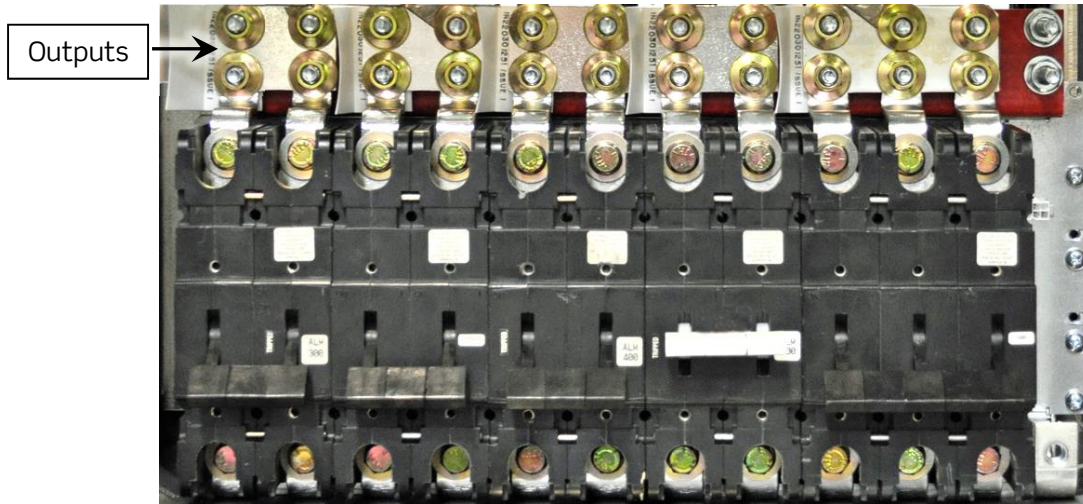


Figure 36 - GJ Panel (with breakers installed)

5. Make return connections to the return bus bars at the top of the distribution section and torque according to the specifications given in Table 6 on page 37.

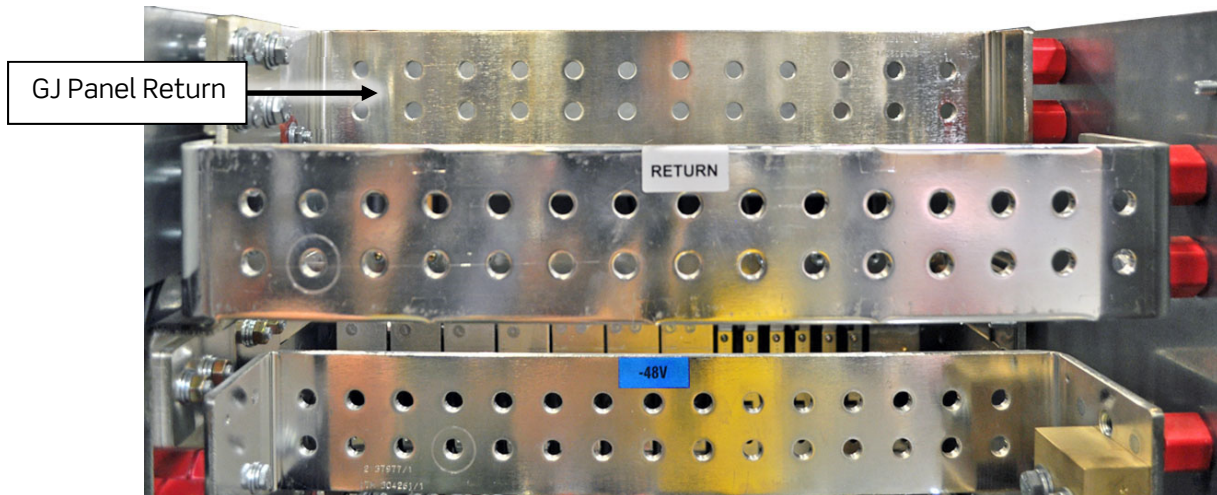


Figure 37 - GJ Panel Return Bar (view from rear of distribution section)

TPL fuses are typically installed in the fuse holders at the factory. They should be removed before cabling.

1. Make sure the fuses are removed before making connections.
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 fuse and torque according to the specifications given in Table 6 on page 37.
5. Make return connections to the return bus bars at the top of the distribution section and torque according to the specifications given in Table 6 on page 37 (same as shown in Figure 14).

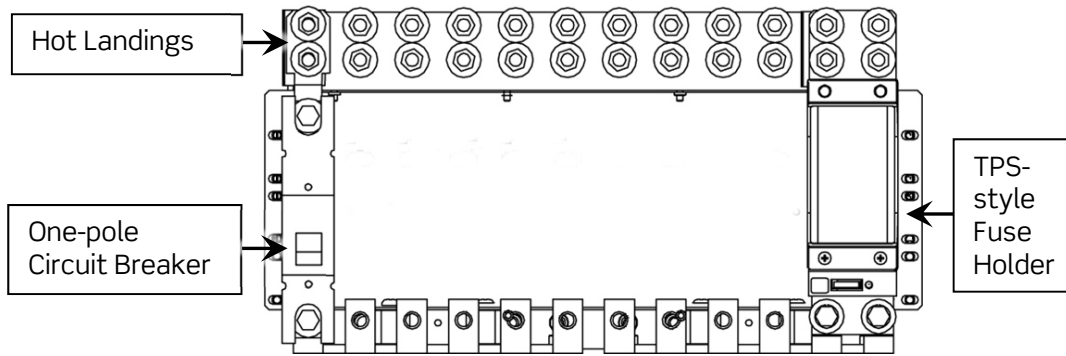


Figure 38 – GJ Panel Devices and Connections

Bulk (DC) and Battery Connections



DANGER: Improper battery connections can cause permanent damage to electrical equipment, serious personal injury, and/or death. Always check polarity before making battery connections.



WARNING: Shock hazard! Use insulated tools, especially when working on live systems.

CAUTION: Do not connect batteries until system startup. It is required that inline circuit breakers or fuses be used with bulk/battery connections.

Batteries should be connected **after** making AC connections and powering rectifiers. The system must be powered to check polarity on the battery bus. Wiring battery output panels may help facilitate later battery connection.

To make battery cable connections:

1. After successful system startup, remove the screws holding the rear cover in place.
2. Make connections using two-hole, 3/8"-16 lugs on 1" centers. Fastening hardware is provided.
3. Torque connections according to the specifications given in Table 6 on page 37.
4. Replace the cover.

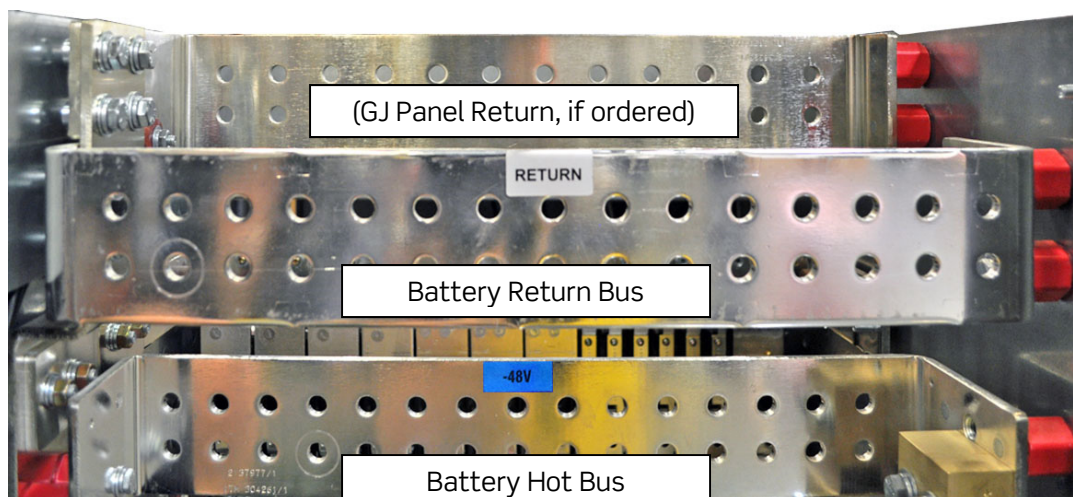


Figure 39 – Battery Buses

Circuit Breaker and Fuse Installation

CAUTION: Significant extraction force is required to remove distribution devices due to the contact pressure required for highly-reliable, low-temperature rise connections. DO NOT use pliers or tools other than the breaker extraction tool.

CAUTION: Circuit breakers (both load and battery) should be in the “OFF” position when installed in the system.

Plug-in Breakers

Auxiliary contact circuit breakers are the standard over-current protection devices used in the distribution section. Breakers are connected to system alarming through the holder so that an open breaker (whether tripped or manually placed in the OFF position) triggers a “Load Distribution Alarm” in the Smartpack controller. Circuit breakers should be removed from any unused positions to prevent nuisance alarms. One-pole circuit breakers rated up to 100A can be installed. For the plug-in board, straps are available to make use of two-pole breakers rated up to 175A and three-pole breakers rated up to 250A.

Plug-in Fuse Holders

Plug-in fuse modules may also be installed. The same considerations regarding insertion and removal of breakers should be observed.

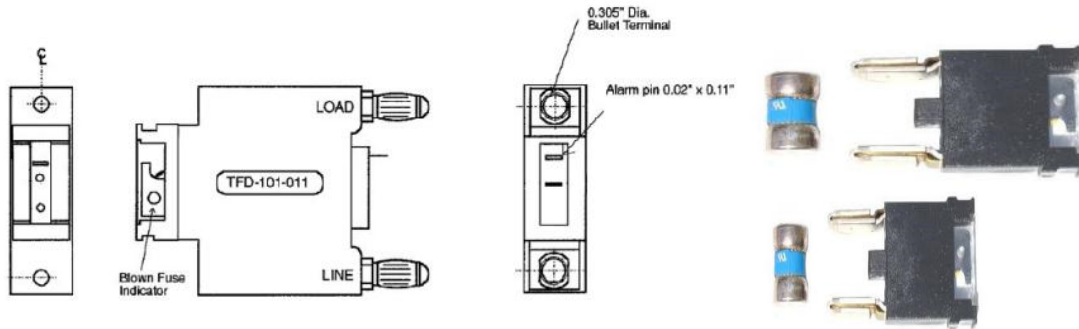


Figure 40 – Fuse Holders

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.

Device Installation and Extraction

To install plug-in breakers or fuse-holders in device holder:

1. Remove fuses from adapters and turn breaker actuators OFF until system startup.
2. Orient the device correctly to the device holder (line is the bottom receptacle, load is the top); securely insert device into the receptacles.

A distribution device extraction tool is available from Eltek. It is shaped like a handle and has two Phillips-head screws. This item is for convenience and should not be necessary for all extractions.



Figure 41 – Circuit Breaker and Fuse Adapter Extraction Tool

To remove plug-in breakers or fuse-holders:

1. Align the extraction tool to the device to be removed.
2. Use a Phillips screwdriver to secure the device.

3. Firmly pull the device out from the holder. Avoid using excessive force or motion to extract an over-current protection device.

Temperature Probe Connections

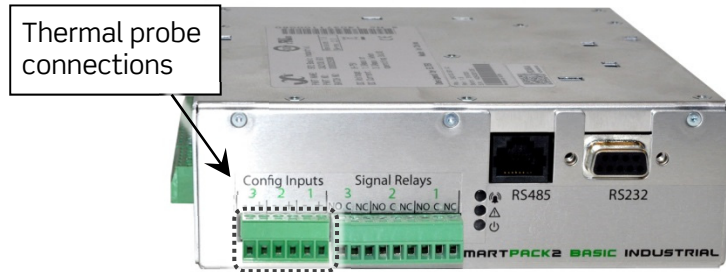


Figure 42 -Temperature Probe Inputs, Basic Industrial Controller

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.
6. Enable Temperature compensation and temperature requirements in using the browser interface via: **System Config>Battery>TempComp** and select **Enable** and **Save**.

Note: If you are unfamiliar with the browser interface, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063. Additional information is contained in the *User Guide: Eltek Controller Web Interface*, Doc. No. 370035.013

Alarm Connections

Alarm connections, both input and output, are made to the I/O Monitor2 device located in the controller tray (bottom of the distribution section).

To make alarm connections:

1. Strip alarm wires back 0.25 in (6-7 mm).
2. Make input/output alarm connections. Maximum wire size is 16 AWG (1.5 mm²). Torque each connection to 3 in-lb. (0.2 N·m).

NOTE: Each of the five terminal blocks can be removed from the I/O Monitor2 by pulling them straight up from the unit. This makes terminations easier to make. Simply plug the block back into the I/O Monitor2 after making alarm connections.

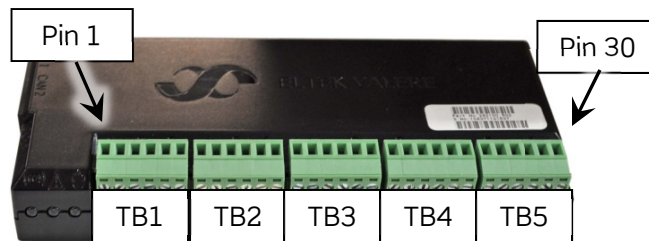


Figure 43 - I/O Monitor2 Terminal Blocks and Terminals

Table 8 - Terminals for I/O Monitor2

Terminal Block	1						2						3						4						5					
Pin Number	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)

Alarm I/O can be configured through either the touch screen or an Ethernet connection after startup. You must first log in as administrator in order to configure alarms.

For additional information regarding configuration, see “Controller and Alarm Configuration,” on page 53. For an explanation of common configuration tasks, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063.

Default Parameters

The following tables show the default parameters for the Modular HE power system.

Table 9 – Default Parameters for Alarm Relays

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					

Controller CAN Connections

Connections for Eltek CAN monitoring devices are made to the CAN port of the I/O Monitor2 in the distribution panel (left wall). This provides a communication link to the Smartpack2 controller system.

To install a CAN device:

1. Remove the CAN termination plug from the port.
2. Install one end of the communication cable into the port.
3. Install the other end of the cable into one of the CAN ports on the device.
4. Install the CAN termination plug in the unused CAN port on the device.
5. For multiple CAN devices, simply daisy-chain them together using the two ports provided on each device. The last device in the chain **MUST** have the CAN termination plug installed in the unused port.

For installation and operation details for each CAN device, consult the documentation provided with it.

Rectifier Module Installation

NOTE: Flatpack2 rectifier modules are assigned a system ID based on order of installation. Therefore, it is recommended to install rectifiers AFTER system startup, in the order desired. See “Rectifier Installation,” page 51.

3. Startup

Ensure that all AC and DC cable connections are properly sized and secure. Then, activate all AC input breakers.

Tasks associated with startup are covered in the following sections:

- Rectifier Installation (next section, below)
- Connecting Batteries, page 52
- Activating DC Breakers and Fuses, page 53
- Controller and Alarm Configuration, page 53

Rectifier Installation

The Flatpack2 family of power modules features a locking mechanism for security in the shelf.

CAUTION: Never carry Flatpack2 modules by the handles, even if they are warm. The handles must be fully extended before installing or removing Flatpack2 modules to prevent damage to either the shelf or module.

CAUTION: Flatpack2 power modules employ double-pole/neutral fusing. Fuses are not field replaceable.

Once AC power is activated, install each module as follows:

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

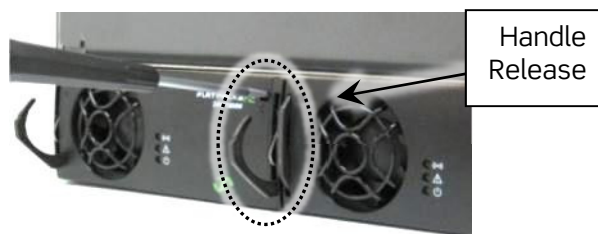


Figure 44 - Releasing the Rectifier Latches

2. Beginning with the first rectifier position (as determined by site policy), slide the first rectifier firmly into the shelf. Wait for green LED to illuminate.
3. Close the latches to lock the rectifier in place.

4. Allow a 2 second delay before inserting the next module.
5. Continue installing rectifiers in the order desired.
6. Repeat steps 1 to 5 until all rectifiers to be used are installed.

Once the first rectifier is properly installed and powered, the controller starts up.

NOTE: Any DC circuit breakers left in the off position may trigger a distribution alarm after the first rectifier is installed. If the load device can be powered at this point, simply switch the breaker ON to clear the alarm.

To remove Flatpack2 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 gripped.
3. Slide the module out the rest of the way. Do not carry it by the handles. Flatpack2 modules weigh just over 4 lbs (1.9 kg) each.

Connecting Batteries



DANGER: Improper battery connections can cause permanent damage to electrical equipment, serious personal injury, and/or death. Always check polarity before making battery connections.



WARNING: Shock hazard! Use insulated tools, especially when working on live systems.

CAUTION: Do not connect batteries until system startup. It is strongly recommended that inline circuit breakers or fuses be used with bulk/battery connections.

Batteries should be connected **after** making AC connections and activating rectifiers. The system must be powered to check polarity on the battery bus. Then, power off the system to connect batteries.

To make cable connections:

1. After successful system startup, remove the screws holding the rear cover in place.
2. Make connections using two-hole, 3/8"-16 lugs on 1" centers. Fastening hardware is provided.

3. Torque connections according to the specifications in Table 6 on page 37.
4. Replace the rear cover.

Activating DC Breakers and Fuses

Once the system and the controller power up properly, the DC load breakers can be activated and fuses installed.

Controller and Alarm Configuration

Controllers are covered in earlier sections, “Controller Specifications,” on page 31; and in the installation section, beginning on page 47. For information regarding controller configuration, see the printed copy of the default configuration that shipped with your system.

The Smartpack2 Touch Controller provides maximum flexibility for direct monitoring, and to configure the controller. Most functions can be accessed using the touch screen and, for ease of use, a mouse and/or keyboard can be plugged into the USB ports on the controller, in order to navigate and enter parameters on the screen.

If you prefer a larger screen, you can connect a computer to the controller, using the Ethernet port on the face of the controller, and employ the web browser interface, as with other Eltek controllers. For an explanation of common tasks performed through the browser interface, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063. For more extensive information, consult the *User Guide: Eltek Controller Web Interface* (Doc. No. 370035.013).

In order to make changes, log in as administrator. The default login credentials are:

User name: **admin**

Password: **admin**

The Smartpack2 Touch screen utilizes the same basic interface as the browser version, except that the Touch controller displays the information in an adaptive format fitted to the smaller screen of the controller. The main navigational difference is that the left menu bar in the browser interface becomes a sub-menu in the Touch interface; the submenu must be accessed first on the Touch screen, in order to select the associated configuration options. The configuration options are

the same as the browser interface, although you may have to scroll further down a page to see all the options.

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*.

4. Startup Checklist

Quick Startup Checklist	
Pre-start Check (Power is OFF)	
☐	Installation site prepared ○ Mounting location is well-ventilated and provides adequate room for airflow ○ Floor is level and capable of supporting the system (Individual system weights vary; see product flyer for more information) ○ Suitable insulated tools available
☐	AC input supply prepared ○ AC supply is compatible with rectifier shelves ○ Supply fuses and/or circuit breakers and wires are properly rated
☐	System components inspected ○ All parts, equipment, documentation, etc. accounted for ○ Components checked for damage; if damaged, contact Eltek
☐	Rack anchored to suitable location
☐	Distribution circuits open ○ Circuit breaker actuators switched OFF ○ Fuses REMOVED
☐	Make AC input connections (power is OFF) ○ Circuit breaker actuators switched off or fuses removed ○ AC ground connections terminated (always connect ground first) ○ AC supply lines are correctly configured to the rectifier shelf terminals
☐	DC load connections made (EXCEPT BATTERIES) ○ Load cables properly connected to system output and return busbars
☐	System alarm cable connected to “Alarm” port on controller
☐	External devices connected to controller (if applicable) ○ PM device(s) (use provided terminators in any open CAN ports) ○ Battery thermal probe cables ○ Auxiliary alarms terminated
Startup Procedure	
☐	Turn on AC breakers and verify proper input voltage
☐	Insert rectifiers in the desired order; system will power up
☐	Insert converters (if applicable) in the desired order
☐	Verify system startup ○ Controller display turns on ○ Controller and rectifier LEDs turn on ○ Rectifier fans activate

Quick Startup Checklist	
☐	Check controller interface - o Check display functionality - o Connect PC to controller - o Insert provided CD into laptop (program will automatically start) - o Verify controller appears in LAN Configuration Utility (no need to log in at this time)
☐	Once alarms are cleared, run relay/alarm tests
Battery Connections (if applicable)	
☐	Measure battery string voltage; adjust system DC output voltage to equal battery voltage
☐	Disconnect (but do not remove from shelves) all but one rectifier
☐	CHECK POLARITY and attach batteries to system - o Terminate cable connections to designated battery landings - o Switch battery circuit breaker actuators ON and/or insert battery fuses (if applicable)
☐	Reconnect all rectifiers
☐	Adjust DC output voltage to equal required battery float voltage
☐	Configure battery settings (if desired) via front display or graphical interface - o Battery boost - o Thermal compensation - o Battery current limit
Load Distribution	
☐	Once battery management is configured, activate load distribution circuits - o Switch circuit breaker actuators to the ON position - o Insert fuses

5. Basic Troubleshooting

In case of alarm conditions, verify the following:

- All AC and DC connections are secured properly.
- All rectifiers are installed and seated properly.
- The controller is installed and seated properly.
- Distribution breakers are in the ON position; fuses are installed and intact (not blown).

Specific rectifier and controller alarm conditions can be found in the following documents:

- *User's Guide: Flatpack2 Rectifiers*, Doc. No. 350002.013
- *User's Guide: Smartpack2 Master Controller*, Doc. No. 350020.013
- *User's Guide: Smartpack2 Basic Industrial Controller*, Doc. No. 350025.013
- *Installation Guide: I/O Monitor2*, Doc. No. 351509.003
- *Product Guide: Modular 15U System*, Doc. No. EDM0000215199

Additional product information is available online at eltek.sharefile.com.

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.

Revision List

Revision	Published	Description	CO
1	7/29/13	First release.	N/A
2	2/14/14	Updated photos (to reflect changes in product labels) and tables.	131113UA
2.1	8/11/2014	Added details on alarm parameters; new photos; updated display procedures.	140811UA
2.2	3/28/2017	Added thermal probe connections; updated torque values; updated photos and branding	N/A
2.3	01/18/2017	Added information for graphic of three-phase terminals.	N/A
2.4	10/05/2018	Updated to reflect current product line.	N/A
3.0	08/08/2019	Updated to reflect current product line. Includes coverage of Touch Controller and new AC connections.	N/A

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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