Installation Manual

Compact “K” and “P” Shelves

Compact DC Power Family

Part. No. DO600000002

Doc. No. 2070149, Issue 10.1

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Safety and Recommended Practices

General Practices

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

The Compact "K" and "P" DC Power Systems operate on an AC voltage between 100 V and 240 V, 50–60 Hz, and produce a regulated DC output of 20–56 V (depending on rectifiers deployed; see Table 1). They are capable of delivering a maximum DC output of 120 A in an ambient operating temperature range of –40°C up to +65°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. 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). Refer to datasheets for full product specifications.

WARNING: For safety, the power supply is required to be reliably connected to PROTECTIVE GROUND. Do not disconnect and reconnect I/O power connectors during a lightning storm. Equipment meets GR-1089 Surge requirements and is intended for deployments where an external Surge Protective Device (SPD) is not utilized.

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 an AC line cord 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 disconnection device must be incorporated in the building installation wiring. Select circuit breaker sizes according to national and local electric codes.

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

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

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 0.5A. Connection and mounting torque requirements are listed in Table 7.

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 provided by Eltek.

Rack mounting must be performed in accordance with instruction provided by the manufacturer to avoid potential hazards.

FCC Compliance Statement

NOTE: The power system complies with Part 15 of Federal Communications Commission (FCC) Rules. Its operation is subject to the following two conditions:

- The system may not cause harmful interference.
- The system must accept any interference received, including interference that may cause undesired operation.

The system has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The system generates, uses, and radiates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If the system causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the system and the receiver.
- Connect the system to an outlet of a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

WARNING: 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.

ICES-003 Class B Notice: This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

1. Overview

The Compact K-shelf and P-shelf systems are 48V DC power systems designed for standard 19" telecommunications racks and accommodate up to three Eltek V-series rectifiers. Brackets for 23" racks are available to order. Compact K and P shelves are identical except for the position of the mounting brackets. K shelves have mid-mount brackets, and P shelves have front flush-mount brackets.

Figure 1 - K Shelf (mid-mount brackets)

Figure 2 - P Shelf (flush-mount brackets)

Rectifier Specifications

Rectifiers that work in the Compact DC power systems are listed in Table 1. Specifications for each model are also given.

Model	Nominal DC Voltage (V DC)	DC Voltage (V DC) Range	Max DC Current (I DC)	Operating AC Voltage (V AC) Range
V0500A	48	42 - 56	10	90 - 264
V0750A	48	42 - 56	15	90 - 264
V1000A	48	42 - 56	20	90 - 264
V1250A	48	42 - 56	25	90 - 264
V1500A	48	42 - 56	30	180 - 264
V2000A	48	42 - 56	40	180 - 264
V2500A	48	42 - 56	50	180 - 264
V1500B	24	21 - 28	60	180 - 264

Table 1 - Rectifier Specifications

Typical and maximum values of heat dissipation for Eltek rectifiers are listed in Table 2. "Typical" is calculated at AC 240 V and nominal DC output voltage and

current values. “Maximum” is calculated at AC 180 V and maximum DC output voltage and current. A minimum of ¾” of space is required above and below Compact DC Power Systems for airflow.

NOTICE: 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.

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

Model	Typical		Maximum	
48V Rectifiers	**BTU/hr**	**Watts**	**BTU/hr**	**Watts**
V0500A	180	53	281	82
V0750A	271	79	435	127
V1000A	361	106	563	165
V1250A	451	132	690	202
V1500A	541	159	844	247
V2000A	722	212	1100	322
V2500A	902	264	1355	397
24V Rectifiers	**BTU/hr**	**Watts**	**BTU/hr**	**Watts**
V1500B	882	258	1041	305

Table 2 - Heat Dissipation

AC Input Requirements

The Compact K and P shelves have AC input architecture that supports single-, dual-, and individual-feed options. The single- and dual-feed shelves are shipped configured for dual-feed and can be converted to single-feed. The AC terminal block is located in the rear of the shelf.

Dual and Single Feed

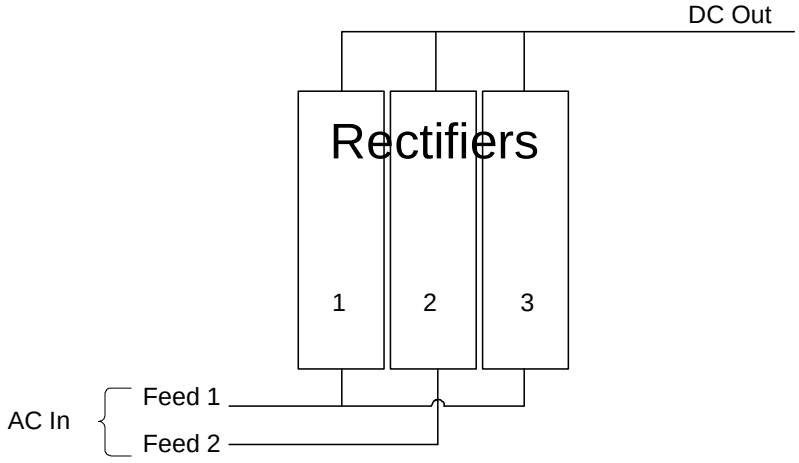


Figure 3 - Dual Feed AC Wiring Architecture

A dual feed architecture is powers rectifier slots 1 and 3 on AC feed 1 and rectifier slot 2 on AC feed 2. The ground wires should be connected first; there are two ¼"-20 studs provided next to the terminal block (see Figure 14). Connect each feed, sized according to specifications in Table 3, onto the #8-32 screw on the rear terminal block. If AC cords from Eltek are not ordered, choose AC ring terminals from the list in Table 4. The AC terminal strip on the rear of the shelf accepts ring terminals that are less than 0.5" in width. Two knockouts are provided for cable entry to the AC block that each accept either an AC cord grip provided by Eltek or a ¾" conduit. Shelves with DC circuit 5 have two knockouts that each accept snap bushings provided by Eltek, and two more knockouts for ½" conduit.

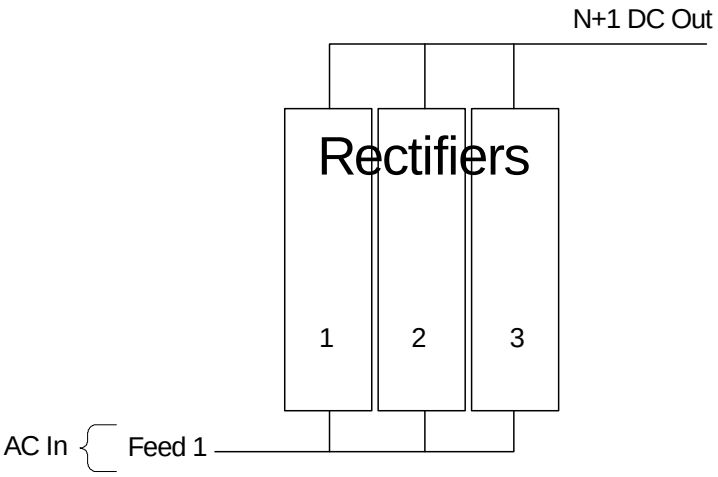


Figure 4 - Single Feed AC Wiring Architecture

A single feed architecture is configured by installing the bus bars provided onto the AC terminal strip. This configuration powers all three rectifier slots on a single AC feed. The ground wire should be connected first; there is a single, ¼"-20 stud provided next to the terminal block (see Figure 15). The AC feed, sized according to specifications in Table 3, connects to the top set of #8-32 screws on the rear terminal strip. There is a set of small bus bars that power the second rectifier from the top AC input terminal. If AC cords from Eltek are not ordered, choose AC ring terminals from the list in Table 4. The AC terminal strip on the rear of the shelf accepts ring terminals that are less than 0.5" in width and a wire size of 6 AWG (16 mm^2). Two knockouts for ¾" conduit are provided for cable entry to the AC block, and AC cord grips are provided. Shelves with DC circuit 5 have two knockouts that each accept snap bushings provided by Eltek, and two more knockouts for ½" conduit.

Individual Feed

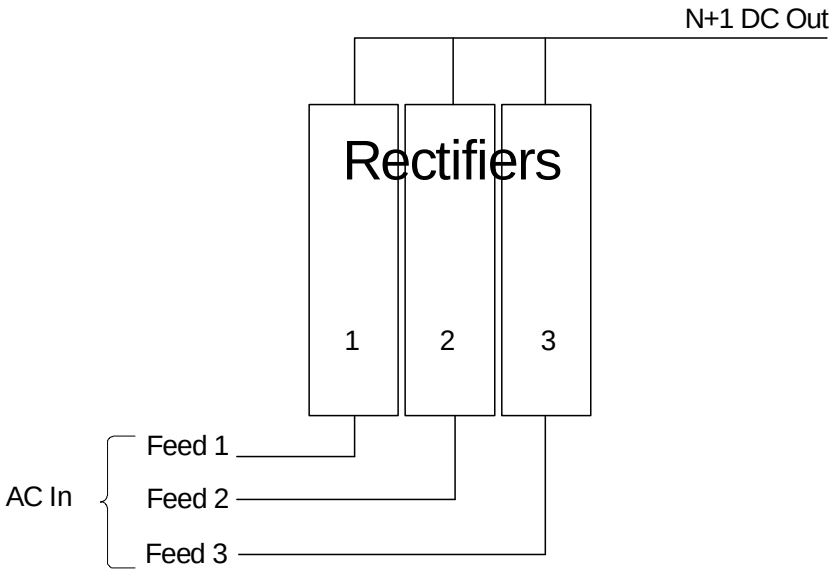


Figure 5 - Individual Feed AC Wiring Architecture

An individual feed architecture powers one rectifier on each AC feed. Connect each feed, sized according to specifications in Table 3, onto the #8-32 screws of the terminal strip. All grounds should be on ¼"-20 studs as shown in Figure 16. Choose AC ring terminals from the list in Table 4. The AC terminal strip on the rear of the shelf can accept ring terminals of less than 0.5" width and a wire size of 10 AWG (6 mm^2). There are two knockouts for ¾" conduit (cord grips are provided) and one knockout for a 1" conduit (the cord grip can be ordered separately).

AC Feed Sizing

To size AC feeds properly, follow the specifications in Table 3. **Failure to size the AC breaker and wiring properly can result in nuisance breaker trips or even fire.** If you anticipate growth, size the AC breaker and wiring for the expected capacity**. Always follow NEC (national electrical code) rules and your local company practices when selecting AC wires and protection devices.**

AC requirements listed in Table 3 are based on the absolute minimum input voltage at which the rectifiers will run. To calculate current draw for a feed with multiple rectifiers, simply multiply the current draw value in Table 3 by the number of rectifiers on the feed.

Model Number of Rectifier	Minimum Input Voltage	Maximum rated AC Current	Minimum circuit breaker
	Volts	Amps	Amps
V0500A	90	7.4	15
V0500A	180	3.7	15
V1000A	90	14.6	15
V1000A	180	7.3	15
V1000A-HE*	90	13.0	15
V1000A-HE*	180	6.6	15
V1250A	90	17.8	20
V1250A	180	9.1	15
V1500A	180	10.9	15
V2000A	180	14.6	15
V2500A	180	18.2	20
V1500B	180	11.2	15

*HE is the high-efficiency line of rectifiers

Table 3 - Rectifier Worst-case Current Draw

AC Lug Requirements

Table 4 lists ring terminal and lug requirements for the AC terminal block. Wire type should be considered when determining the type of ring terminal or lug to use.

Wire size		Burndy Lug	AMP ring terminal	Description
AWG	mm^2	Part number	Part number	
14	2.5		321045	For **ground** connection on **single** or **dual** feed
14	2.5		320565	For **line** connections on **single**, **dual** or **individual** feed
12	4.0		323763	For **ground** connection on **single** or **dual** feed
12	4.0		35605	For **line** connections on **single, dual** or **individual** feed
10	6.0		323763	For **ground** connection on **single** or **dual** feed
10	6.0		35605	For **line** connections on **single or dual** feed
8	10.0	YA8CL1BOX		For **ground** connections on **single** or **dual** feed
8	10.0	YA8CLNT6		For **line** connections on **single** or **dual** feed
6	16.0	YA6CLBOX		For **ground** connections on **single** feed
6	16.0	YA6CLNT6		For **line** connections on **single** feed

Table 4 - Lug Part Number for AC Input

DC Output Requirements

DC Circuit Drawings

The DC circuit number can be determined from the model number, which is located on the product label on the right side of the shelf (when facing the front). Suppose the model number is CK5S-ANL-VC. The number "5" indicates the circuit number. For details about the DC circuit type for your system, see the following sections.

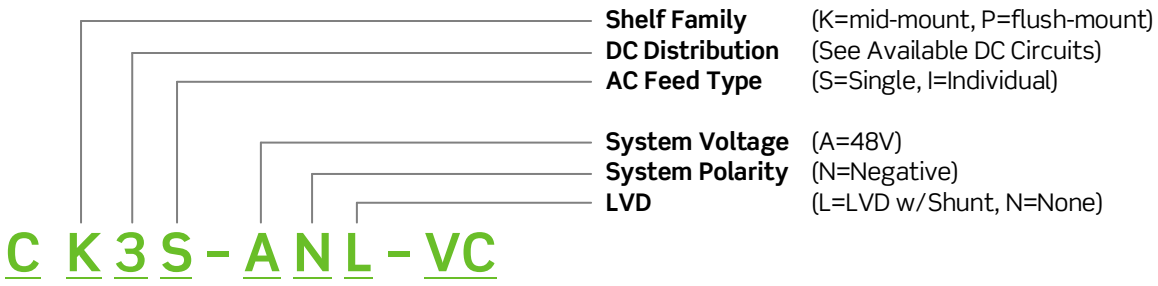


Figure 6 - Compact Shelf Model Number Decoder

All circuits are available with an option for a low-voltage disconnect (LVD) contactor and a shunt. The last character in the second part of the model number (see Figure 6) indicates whether the system has a shunt and LVD (L) or not (N).

NOTE: Circuit 5 with the LVD option does not have a shunt.

NOTE: Not all circuits discussed are available for the Compact P shelf.

Overcurrent protection devices to be used with these systems are UL-approved bullet-style breakers of up to 100 A and GMT fuses of up to 15 A (if equipped with a GMT fuse block).

Circuit 3

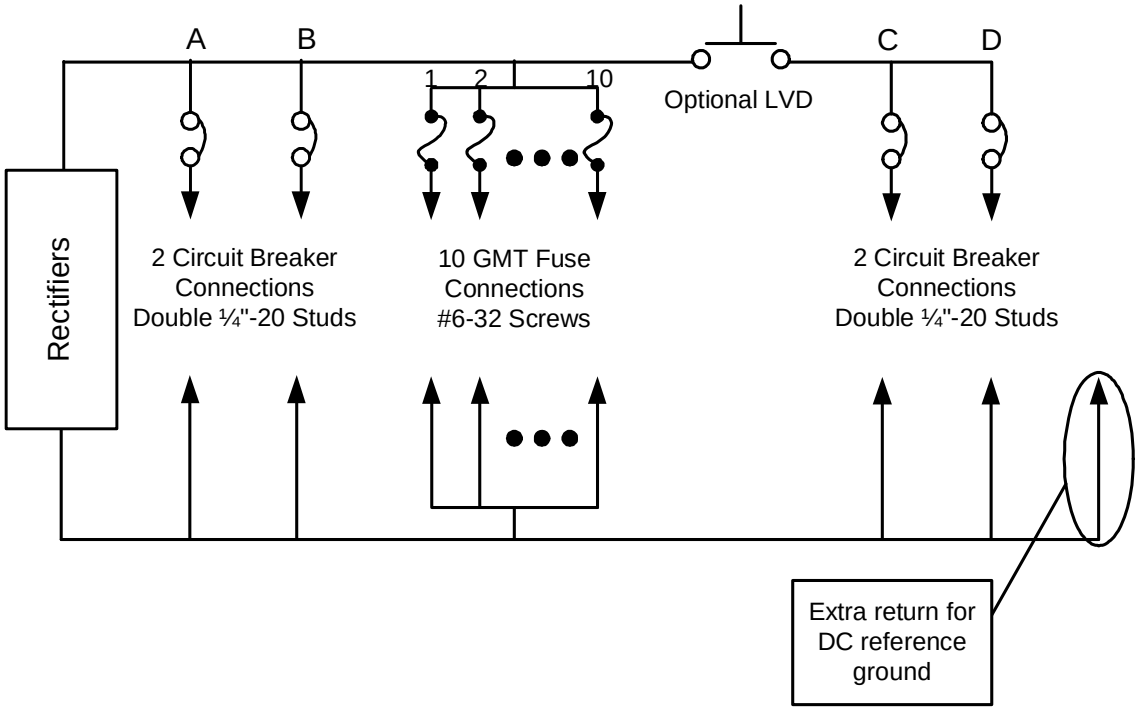


Figure 7 - DC Distribution (Circuit 3)

Each circuit 3 system is equipped with ten GMT fuses and four circuit breakers, with breakers C and D connected through an optional LVD contactor as shown in Figure 7. GMT fuse connections are made with

ring terminals on #6-32 screws. The maximum wire size for fuse connections is 12 AWG. Select a wire size for each GMT fuse connection according to the fuse current rating listed in Table 6. Circuit breaker connections are made with double-hole lugs on ¼"-20 studs with 5/8" centers. The maximum tongue width for breaker connections is 0.67". Breaker positions A-D in Figure 7 correspond to positions A-D in Figure 19. Choose lugs and ring terminals according to specifications in Table 5. An extra return connection is available for the DC reference ground.

Circuit 4

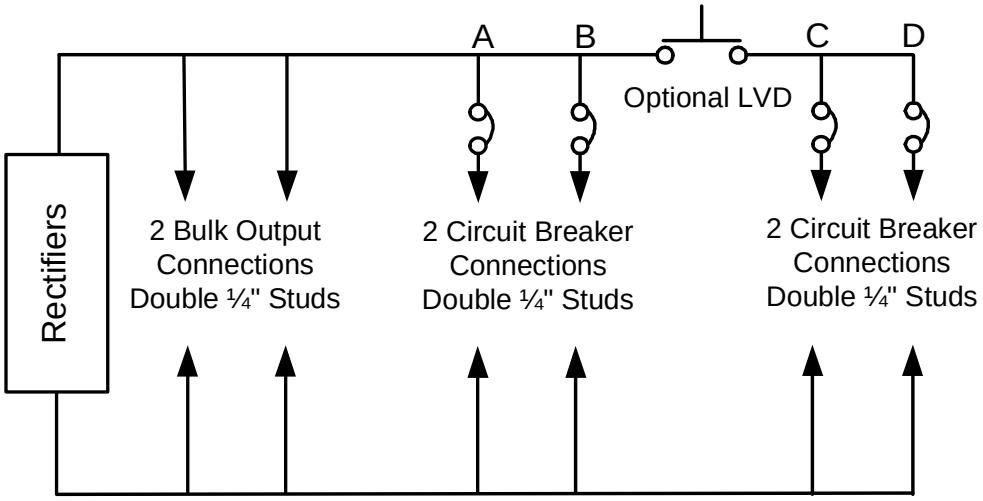


Figure 8 - DC Wiring Diagram (Circuit 4)

Each circuit 4 system is equipped with two unprotected bulk output connections and four protected circuit breaker connections, with breakers C and D connected through an optional LVD contactor as shown in Figure 8. Circuit breaker connections are made with double-hole lugs on ¼"-20 studs with 5/8" centers. The maximum tongue width for breaker connections is 0.67". Breaker positions A-D in Figure 8 correspond to positions A-D in Figure 20. Unprotected bulk connections are made with double-hole lugs on ¼"-20 studs with 5/8" centers. The maximum tongue width for bulk connections is 0.76". An extra set of ¼"-20 studs with 5/8" centers is provided on the return side of the bulk output for connecting the DC reference ground. Choose lugs and ring terminals according to specifications in Table 5.

Circuit 5

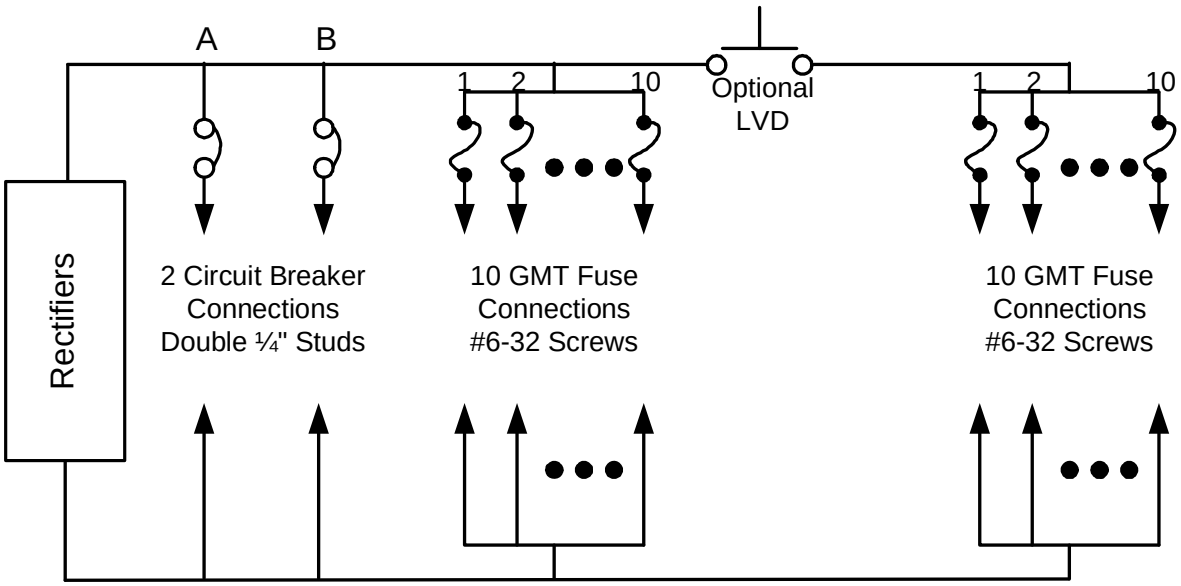


Figure 9 - DC Wiring Diagram (Circuit 5)

Each circuit 5 system is equipped with ten primary GMT fuses and two circuit breakers connected as shown in Figure 9. In addition, ten secondary GMT fuse connections are in series with an optional LVD contactor, which may be used as a load disconnection means. The LVD option does not come with a shunt. GMT fuse connections are made with ring terminals on #6-32 screws. The maximum wire size for fuse connections is 12 AWG. Select a wire size for each GMT fuse connection according to the fuse current rating listed in Table 6. Circuit breaker connections are made with double-hole lugs on ¼"-20 studs with 5/8" centers. The maximum tongue width for breaker connections is 0.67". Breaker positions A-B in Figure 9 correspond to positions A-B in Figure 22. Choose lugs and ring terminals according to specifications in Table 5. An extra return connection is available for the DC reference ground.

Circuit 7

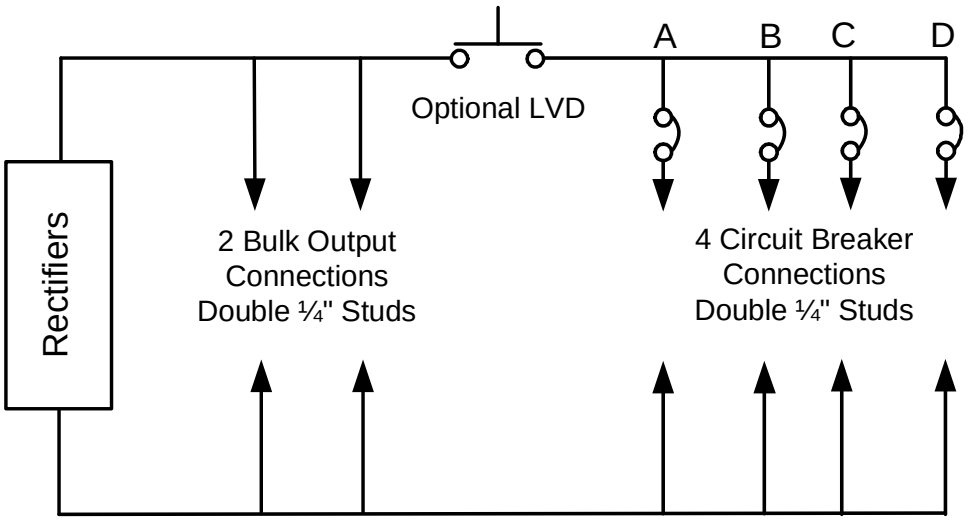


Figure 10 - DC Wiring Diagram (Circuit 7)

Each circuit 7 system is equipped with two unprotected bulk output connections and four protected circuit breaker connections, with all breakers connected through an optional LVD contactor as shown in Figure 10. Circuit breaker connections are made with double-hole lugs on ¼"-20 studs with 5/8" centers. The maximum tongue width for breaker connections is 0.67". Select a wire size for each breaker connection according to the breaker current rating listed in Table 5. Breaker positions A-D in Figure 10 correspond to positions A-D in Figure 24. Unprotected bulk connections are made with double-hole lugs on ¼"-20 studs with 5/8" centers. The maximum tongue width for bulk connections is 0.76". Choose lugs and ring terminals according to specifications in Table 5.

DC Reference Grounding

The power system is a fully floating system. This means that the return bus bar is not tied to the chassis or an earth ground. An external reference or earth ground may be connected to any return connection; circuits 3 and 5 provide designated "DC reference ground" connections. The DC reference ground attachment point is internally wired to all fuse, circuit breaker, and bulk return connections. Follow your company's guidelines for sizing and attaching a reference ground.

DC Output Wire Sizing

There are two main considerations for sizing a DC wire: ampacity and voltage drop. Ampacity refers to the safe current-carrying capacity of a wire as specified by non-profit organizations such as Underwriters Laboratories (UL) and the National Fire Protection Association (NFPA),

which publishes the National Electrical Code (NEC). Voltage drop is the amount of voltage loss in a length of a wire due to ohmic resistance of the conductor. A DC wire may be sized for either ampacity or voltage drop, depending on loop length and conductor heating. In general, for ampacity considerations, wires of length less than 50 feet are selected, and for voltage drop considerations, wires of length more than 50 feet are selected. The NEC provides ampacity values for various wire sizes, wire bundles, and insulation temperature–rated wires. **Always follow NEC rules and your local company practices when selecting DC wires and protection devices.**

The size of wires for DC circuit breakers must be based on the breaker size rating. The size of wires for DC GMT fuses must be based on the GMT fuse size rating. The selection of unprotected DC output wires is based on the total rectifier capacity of the shelf.

DC Lug Requirements

Table 5 lists lug part numbers from Burndy and ring terminals from AMP that can be used for bulk output connections. These part numbers are of lugs and ring terminals used with flex conductor cable. Wire types should be considered when determining the type of lug to use. Follow your company practices when determining the exact lug and ring terminals required.

Wire size		Burndy Lug	AMP Ring Term.	Description	Tongue Width
AWG	mm2	Part No.	Part No.		(Lugs only)
16	1.5		321045	Single hole ring terminal with 1/4" hole	
14	2.5		321045	Single hole ring terminal with 1/4" hole	
12	4		323763	Single hole ring terminal with 1/4" hole	
10	6	YAV102TC14		Double hole lug with 1/4" holes and 5/8" centers	0.47"
8	10	YA8CL2TC14		Double hole lug with 1/4" holes and 5/8" centers	0.44"
6	16	YAV6CL2TC14FX		Double hole lug with 1/4" holes and 5/8" centers	0.48"
4	25	YAV2CL2TC14FX		Double hole lug with 1/4" holes and 5/8" centers	0.55"
2	35	YAV2CL2TC14FX		Double hole lug with 1/4" holes and 5/8" centers	0.68"
1	50	YAV1CL2TC14FX		Double hole lug with 1/4" holes and 5/8" centers	0.75"

Table 5 - Lug Part Number for DC Output

Ring terminal specifications for GMT fuse output connections are listed in Table 6. Some part numbers for standard ring terminals are also given. Wire type should be considered when determining the proper lug to use.

Wire Size		AMP Ring Terminal	Description
AWG	mm^2	Part No.	
24	0.24	53115-2	Single hole ring terminal with #6 hole
22	0.5	51863	Single hole ring terminal with #6 hole
20	0.75	51863	Single hole ring terminal with #6 hole
18	1	51863	Single hole ring terminal with #6 hole

Table 6 - GMT Ring Terminal Part Number for DC Output

References

This manual provides a comprehensive overview of and installation guidelines for the Compact DC power system. Refer to the following documents for operational information regarding system components:

Document Number	Document Description
2052369	Datasheet – V-series Rectifiers
2055882	User's Guide – BC2000/JC2000 Controller Display
2056625	User's Guide – BC2000/JC2000 Web Interface
2052286	Ordering Guide – Compact Systems

Documentation is available online for download at *eltek.sharefile.com*.

2. Installation

Before installing the power system the following safety requirements should be considered.

- **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.
- **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).

Torque Settings

Table 7 lists recommended torque settings for all mechanical and electrical connections according to screw or nut size. Torque values are given in both American (in·lb) and international (N·m) units.

Screw or Nut Size	Torque (in-lb)	Torque (ft-lb)
#10-32	21-31.2	--
#12-24	36-42	--
1/4"-20	--	4.25-11
Fuse Terminal	7.6-9.0	

Table 7 - Recommended Torque Settings

Required Tools

The power system is designed to be installed with a minimum number of commonly available tools.

- #1 and #2 Phillips screwdrivers
- Torque wrench
- 5/16” and 7/16” box wrenches, sockets, and nut drivers
- Wire and cable strippers
- Wire and cable crimpers

Site Preparation

Before unpacking the DC power system, note any physical package damage that could indicate potential damage to the contents. After removing the system from boxes and packing material, inspect for any shipping or other damage. Contact sales or technical support immediately if you notice any damage.

Have all tools, wires, cables, hardware, and so on within easy reach. To the extent possible, ensure a clean (free of debris, dust, and foreign material) work environment. Care should be taken during the installation process to prevent exposure of the equipment to wire clippings. If possible, rectifiers should remained sealed in their shipping boxes until the shelf wiring is complete. Ensure that all AC and DC power sources are off and disconnected.

Mechanical Mounting

The system is intended for normal operations and is to be installed in a standard 19” telecommunications rack. Eltek recommends that one person should hold the shelf into position in the rack while another person should secure the shelf to the rack by using the mounting hardware shipped with the system. For recommended torque settings, see Table 7. A minimum gap of ¾” above and below the system is required for proper airflow. Compact K and P shelves differ only in the position of the mounting bracket. K shelves have mid-mount brackets, and P shelves have front flush-mount brackets.

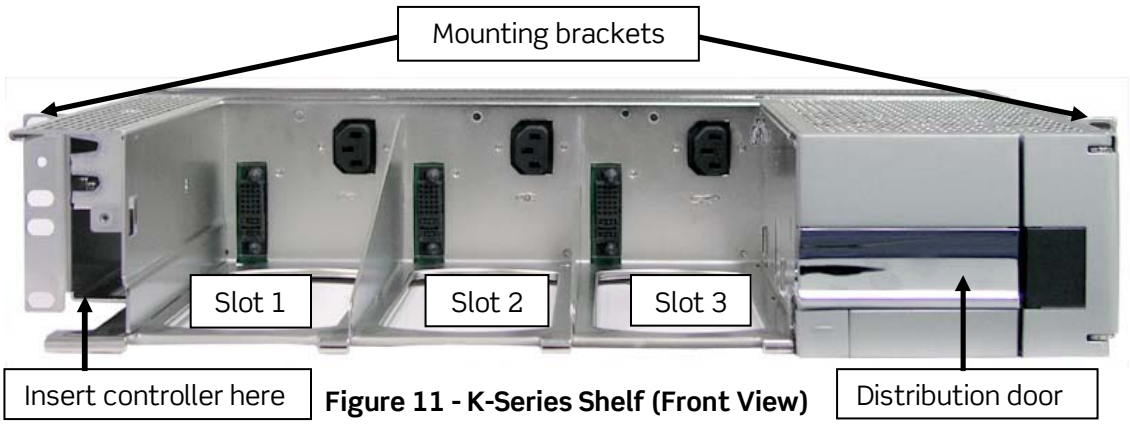


Figure 11 - K-Series Shelf (Front View)

Figure 12 - K-series shelf (rear view)

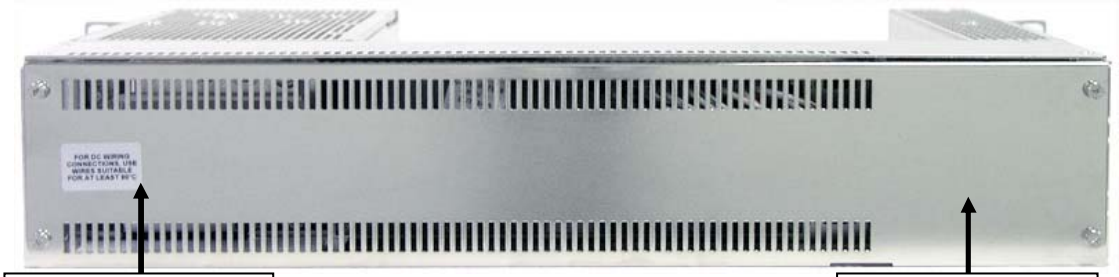


Figure 13 - K-series, circuit 5 (rear view)

Controller Connections

Any BC-series controller is compatible with the power system. Install the controller into the controller slot, which is on the left side of the shelf (see Figure 11). Only gentle force is required to fully install the controller module. If the controller does not mate with the backplane, simply withdraw the chassis, realign, and try again. Excessive force can bend or break the pins of the connector, permanently damaging the controller. For more information about installing peripheral connections, refer to the Installation and Operation manual that is shipped with the controller unit. System controllers are sold separately.

AC Input Connections

There are two AC input feed configurations available: dual and individual. A dual-feed AC box can be modified for single-feed by following the instructions in the section "Single Feed", beginning on page 22.

Remove knockouts and install a conduit or cord grip before connecting AC wiring. There are two knockouts for ¾" conduit (provided) and one knockout for a 1" conduit (available for order separately).

Dual Feed

Make these connections with single-hole ring terminals on #8-32 screws, and follow torque settings listed in Table 7.

To install AC 110 V:

1. Always make ground connections first. Ground leads should be longer than the AC lines. Make the ground connections with single-hole lugs onto the ¼"-20 stud labeled with the ground symbol, and follow torque settings listed in Table 7.
2. Connect the first line/hot to Line 1, labeled on the AC terminal block (Figure 14).
3. Connect the neutral to the slot labeled Line 1/N1.
4. For the second feed, connect line/hot to the slot labeled Line 2.
5. Connect the neutral to the slot labeled Line 2/N2.

To install AC 208/220 V:

1. Always make ground connections first. Ground leads should be longer than the AC lines. Make the ground connections with single-hole lugs onto the ¼"-20 stud labeled with the ground symbol, and follow torque settings listed in Table 7.
2. Connect the first line/hot to Line 1, labeled on the AC terminal block (Figure 14).
3. Connect the second line/hot to the slot labeled Line 1/N1.
4. For the second feed, connect line/hot to the slot labeled Line 2.
5. Connect the second line/hot to the slot labeled Line 2/N2.

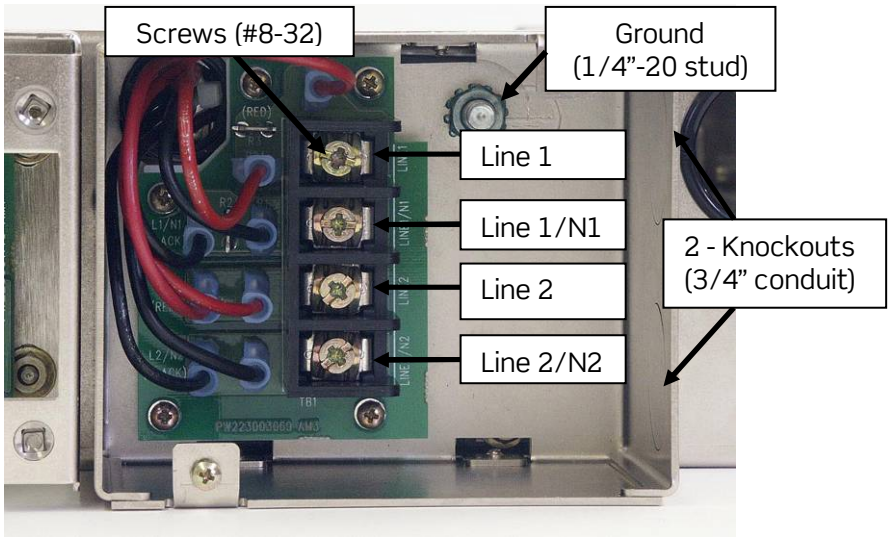


Figure 14 - AC Terminal Block Connections (Dual Feed)

Single Feed

To convert a dual feed box to single feed, install the terminal straps provided. The straps are small bus bars (part numbers B0247011513 and B0247011512) that, when installed, allow all rectifier slots to be fed by a single AC input.

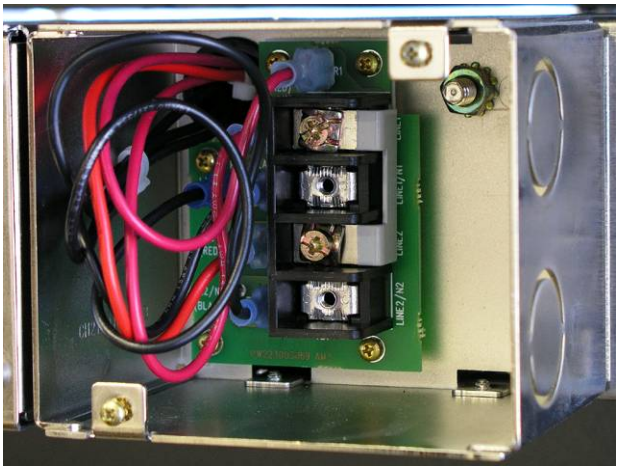
WARNING: AC breaker and wire sizing must be adjusted for a single AC input feed.

WARNING: Once the bus bar straps are added only one AC feed can be connected to the power shelf. DO NOT attempt to connect a second feed in parallel.

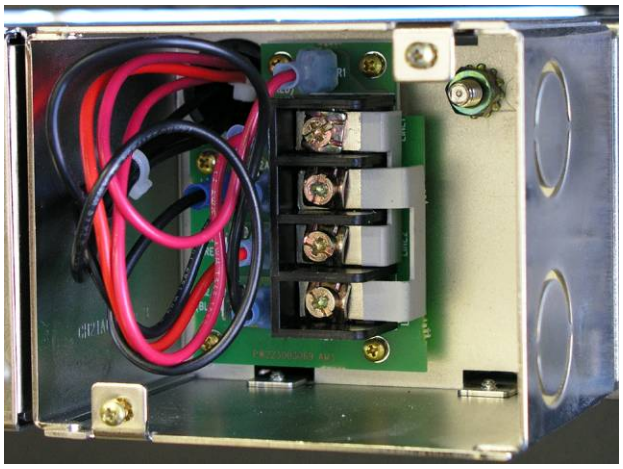
To install the AC straps:

CAUTION: Ensure that AC power is removed from the system before following these instructions.

1. Remove the cover to the AC section. The AC section may look similar but not identical to the photos below, which depict the AC section of a K-series shelf.
2. Remove four terminal block screws.
3. Insert B0247011512 from screw labeled "Line 1" (top screw) to "Line 2" (third screw from the top).
4. Secure bus bar using the screws removed in step 2.



5. Insert B0247011513 from screw labeled “Line 1/N” (second screw from the top) to “Line2/N2” (bottom screw).
6. Secure bus bar using the screws removed in step 2.



7. Follow directions for single feed AC installation per the installation and operation manual provided with the shelf.
8. Torque all screws to 18 in-lbs.
9. Replace cover over AC section before activating AC breakers.

Make AC line connections with single-hole ring terminals on #8-32 screws, and follow torque settings listed in Table 7.

To install AC 110 V:

1. Always make ground connections first. Ground leads should be longer than the AC lines. Make the ground connections with single-hole lugs onto the ¼”-20 stud labeled with the ground symbol, and follow torque settings listed in Table 7.
2. Connect the line/hot to Line 1, labeled on the AC terminal block (Figure 15).

3. Connect the neutral to the slot labeled Line 1/N1.

To install AC 208/220 V:

1. Always make ground connections first. Ground leads should be longer than the AC lines. Make the ground connections with single-hole lugs onto the ¼"-20 stud labeled with the ground symbol, and follow torque settings listed in Table 7.
2. Connect the first line/hot to Line 1, labeled on the AC terminal block (Figure 15).
3. Connect the second line/hot to the slot labeled Line 1/N1.

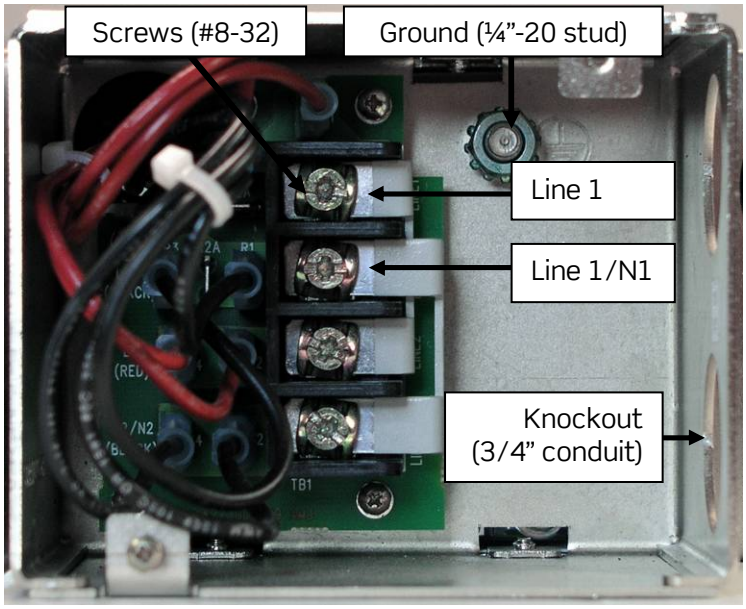


Figure 15 - AC Terminal Block Connections (Single Feed)

Individual Feed

Make AC line connections with single-hole ring terminals on #8-32 screws, and follow torque settings listed in Table 7.

To install AC 110 V:

1. Always make ground connections first. Ground leads should be longer than the AC lines. Make the ground connections with single-hole lugs onto the ¼"-20 stud labeled with the ground symbol, and follow torque settings listed in Table 7.
2. Connect each line/hot to Line 1 (L1), rectifier 1 (R1), labeled on the AC terminal block (Figure 16).
3. Connect the neutral to the slot labeled Line 2/N (L2), rectifier 1 (R1).
4. Repeat the procedure for each remaining rectifier.

To install AC 208/220 V:

1. Always make ground connections first. Ground leads should be longer than the AC lines. Make the ground connections with single-hole lugs onto the ¼"-20 stud labeled with the ground symbol, and follow torque settings listed in Table 7.
2. Connect the line/hot to Line 1 (L1), rectifier 1 (R1), labeled on the AC terminal block (Figure 16).
3. Connect the second line/hot to the slot labeled Line 2/N (L2), rectifier 1 (R1).
4. Repeat the procedure for each remaining rectifier.

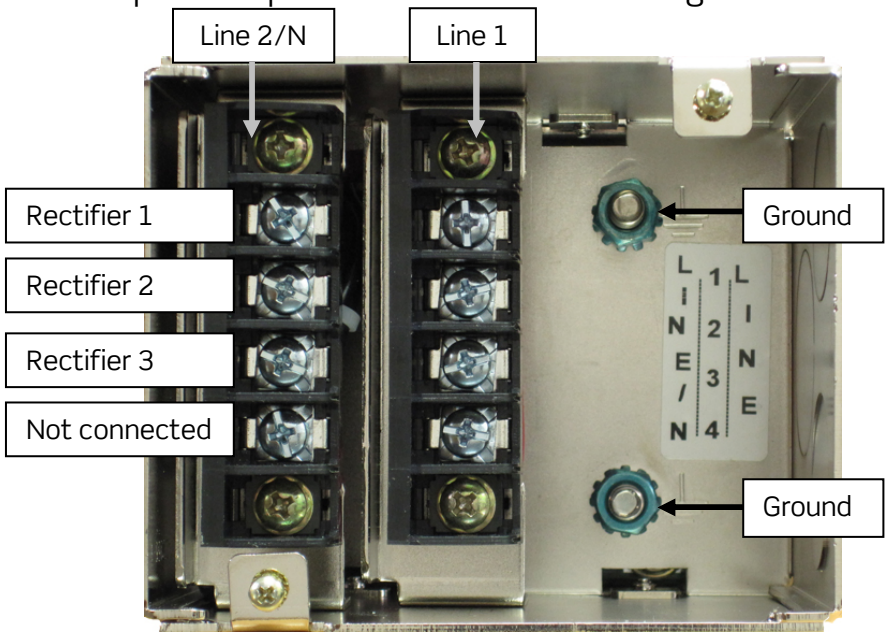


Figure 16 - AC Connections (Individual Feed)

DC Output Connections

WARNING: It is very important to verify polarity of all shelf connections, as well as of batteries, before connecting batteries to the shelf. A wrong connection can cause the system not to work properly, can damage the shelf, and may cause bodily harm. For continued protection against fire, replace a fuse with another of only same type and rating. Indicating fuses have exposed live parts. Use caution when replacing or servicing them.

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

NOTE: Use the distribution label card, located on the door of the distribution section, to document fuse and breaker locations.

Figure 17 illustrates the proper wire routing for breaker connections.

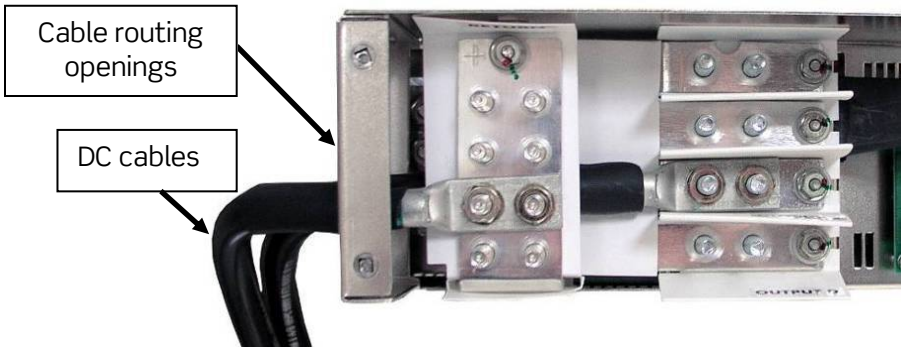


Figure 17 - Breaker Wire Direction

Circuit 3

Circuit 3 contains four circuit breaker and ten GMT fuse connections. All DC connections are accessible from the rear (Figure 19), whereas circuit breakers and fuses are accessible from the front (Figure 18).

For GMT output and return connections, connect ring terminals onto the #6-32 screws on the GMT terminal strips accessible from the rear (Figure 19). Select wire and ring terminal sizes according to the specifications in Table 6. GMT cables should be routed straight down through the cable holes just below the GMT terminal block. Install fuses into appropriate slots in the GMT fuse block shown in Figure 18.

For load circuit breaker output and return connections (positions A and B), connect lugs to the double ¼"-20 studs with 5/8" centers, accessible from the rear, as shown in Figure 19. Circuit breakers can be found behind the distribution door on the right side of the system when viewing it from the front (Figure 18). Size wires and lugs according to specifications in Table 5. Breaker cables should be routed through the cable holes on the left side of the shelf when viewing it from the rear (Figure 17). DO NOT connect an equipment load to LVD-protected output connections.

For battery circuit breaker output and return connections (positions C and D), connect lugs to the double ¼" -20 studs with 5/8" centers, accessible from the rear, as shown in Figure 19. Circuit breakers can be found behind the distribution door on the right side of the system when viewing it from the front (Figure 18). Size wires and lugs according to specifications in Table 5. Breaker cables should be routed through the cable holes on the left side of the shelf when viewing it from the rear (Figure 17). If no LVD is installed, all circuit breaker connections can be used for either load or battery connections.

Connect a DC reference ground to extra return connection next to the GMT connections shown in Figure 19. This connection has double ¼"-20 studs with 5/8" centers.

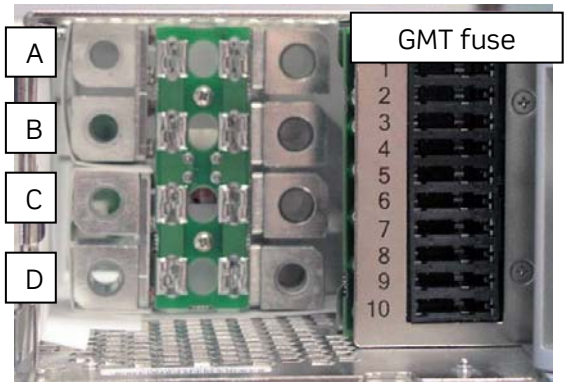


Figure 18 - Front Distribution View (Circuit 3)

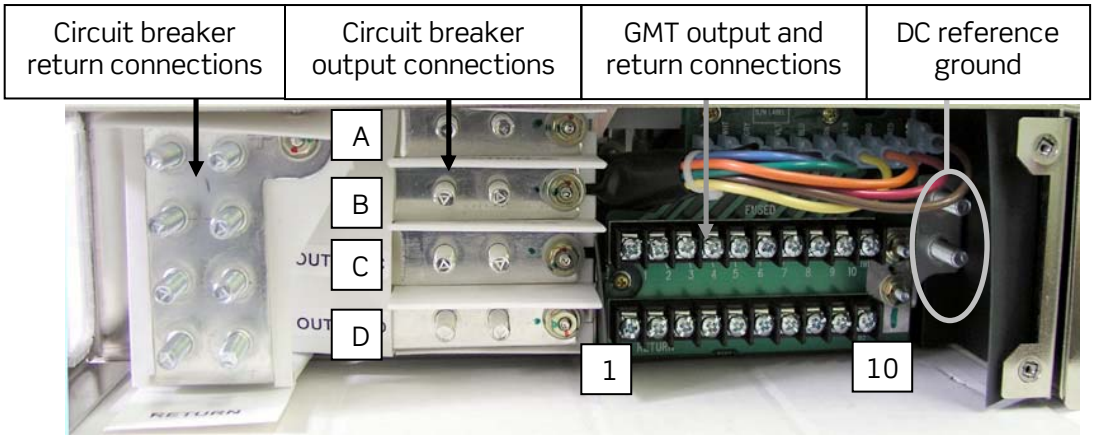


Figure 19 - Rear Distribution View (Circuit 3)

Circuit 4

Circuit 4 contains four circuit breaker and two bulk output connections. All DC output connections are accessible from the rear (Figure 21), whereas circuit breakers are accessible from the front (Figure 20).

For bulk output and return connections, connect lugs to the double ¼"-20 studs with 5/8" centers (accessible through an opening in the bottom of the rear cover) as shown in Figure 21. Be sure to connect the equipment with the correct polarity. Select wire and lug sizes according to specifications in Table 5. Bulk cables should be routed straight down through the cable holes just below the bulk landings.

For load output and return circuit breaker connections (positions A and B), connect lugs to the double ¼"-20 studs with 5/8" centers, accessible from the rear, as shown in Figure 21. Circuit breakers can be found behind the distribution door on the right side of the system when viewing it from the front (Figure 20). Size wires and lugs according to specifications in Table 5. Breaker cables should be routed through the cable holes on the left side of the shelf when viewing it from the rear (Figure 17). **Do not connect an equipment load to LVD-protected output connections.**

For battery output and return circuit breaker connections (positions C and D), connect lugs to the double ¼"-20 studs with 5/8" centers, accessible from the rear, as shown in Figure 21. Circuit breakers can be found behind the distribution door on the right side of the system when viewing it from the front (Figure 20). Size wires and lugs according to specifications in Table 5. Breaker cables should be routed through the cable holes on the left side of the shelf when viewing it from the rear (Figure 17). If no LVD or battery shunt is installed, all circuit breaker connections can be used for either load or battery connections.

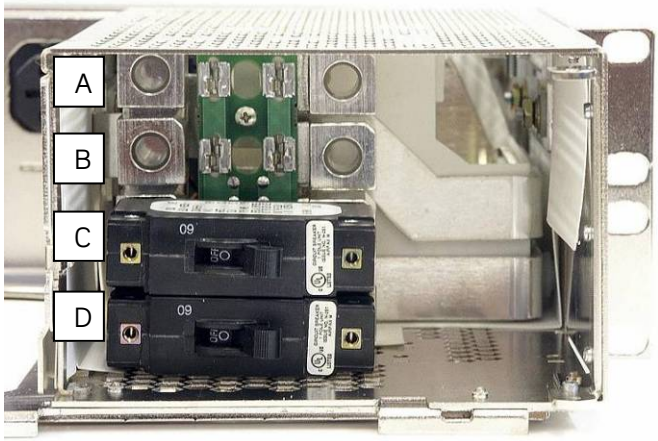


Figure 20 - Front Distribution View (Circuit 4)

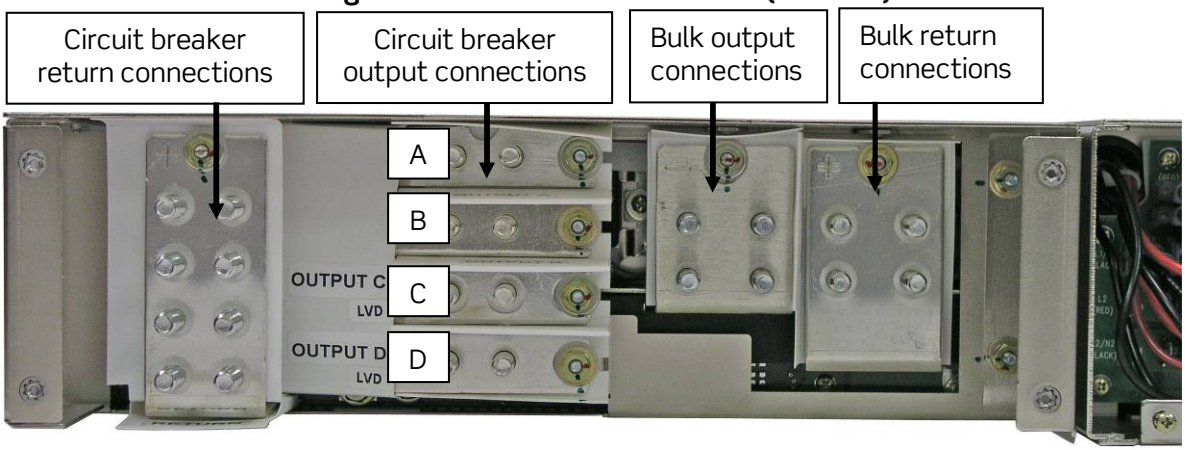


Figure 21 - Rear Distribution View (Circuit 4)

Circuit 5

Circuit 5 contains two circuit breaker and twenty GMT fuse connections. All DC connections are accessible from the rear (Figure 23), whereas circuit breakers and fuses are accessible from the front (Figure 22).

For GMT output and return connections, connect ring terminals onto the #6-32 screws on the GMT terminal strips accessible from the rear (Figure 23). Select wire and ring terminal sizes according to the specifications in

Table 6. GMT cables should be routed straight down through the cable holes just below the GMT terminal block. Install fuses into appropriate slots in the GMT fuse block shown in Figure 22.

For battery circuit breaker output and return connections (positions A and B), connect lugs to the double ¼" -20 studs with 5/8" centers, accessible from the rear, as shown in Figure 23. Circuit breaker positions are located behind the distribution door on the right side of the system when viewing it from the front (Figure 22). The cover must be removed in order to install breakers; use a small Philips screwdriver to loosen the captive screw and release the cover. Size wires and lugs according to specifications in Table 5. Breaker cables should be routed through the cable holes on the left side of the shelf when viewing it from the rear.

Connect a DC reference ground to extra return connection next to the GMT connections shown in Figure 23. This connection has double ¼"-20 studs with 5/8" centers.

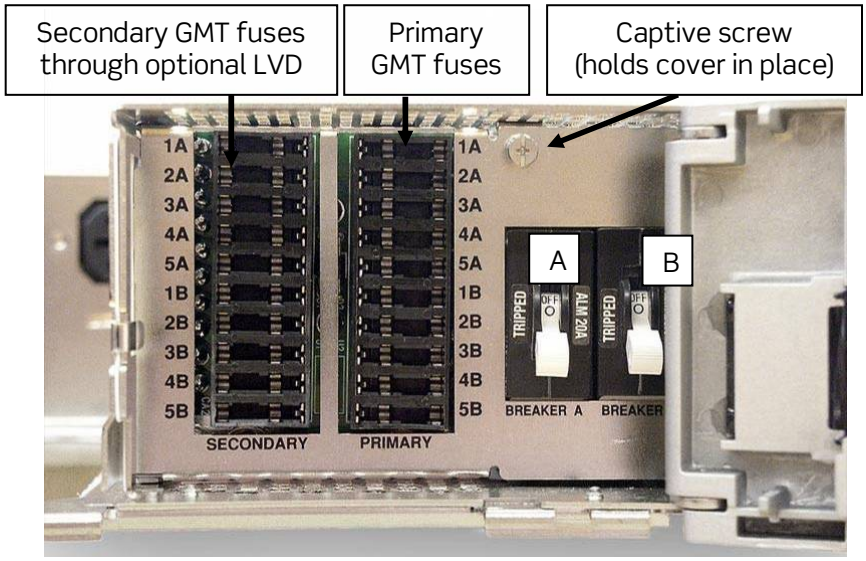


Figure 22 - Front Distribution View (Circuit 5)

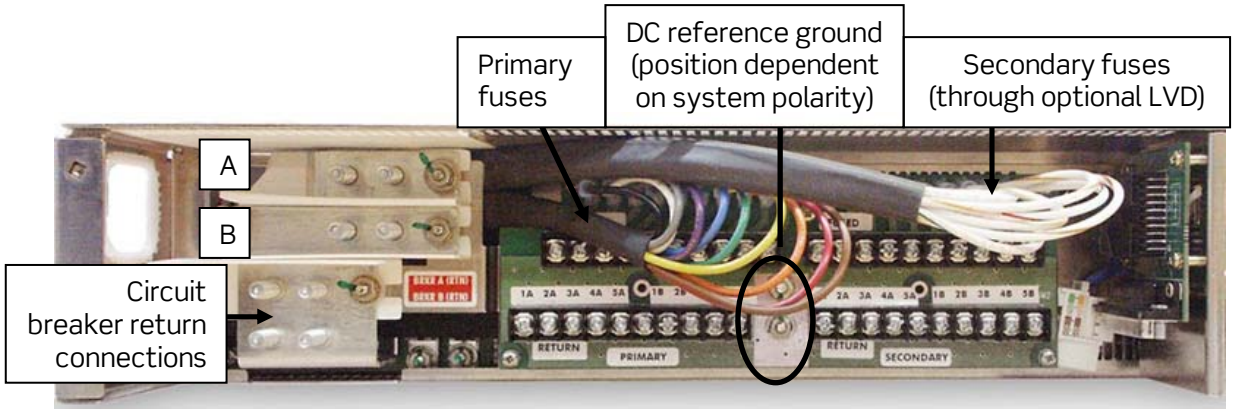


Figure 23 - Rear Distribution View (Circuit 5)

Circuit 7

Circuit 7 contains two bulk connections and four circuit breaker connections, with four breakers through an optional LVD. All DC output connections are accessible from the rear (Figure 25), whereas circuit breakers are accessible from the front (Figure 24).

For bulk connections, connect lugs to the double ¼"-20 studs with 5/8" centers, accessible from the rear, as shown in Figure 25. Be sure to connect the equipment with the correct polarity. An extra set of double studs is available on the bulk output connections. Its position is dependent on the system polarity. Use this extra connection to connect the DC reference ground. Select wire and lug sizes according to specifications in Table 5. Bulk cables should be routed straight down through the cable holes just below the bulk landings.

For battery circuit breaker connections (positions A through D), connect lugs to the double ¼"-20 studs with 5/8" centers, accessible from the rear, as shown in Figure 25. Circuit breakers can be found behind the distribution door on the right side of the system when viewing it from the front (Figure 24). Size wires and lugs according to specifications in Table 5. Breaker cables should be routed through the cable holes on the left side of the shelf when viewing it from the rear (Figure 17). If no LVD or battery shunt is installed, all circuit breaker connections can be used for either load or battery connections. **DO NOT connect an equipment load to LVD-protected output connections.**

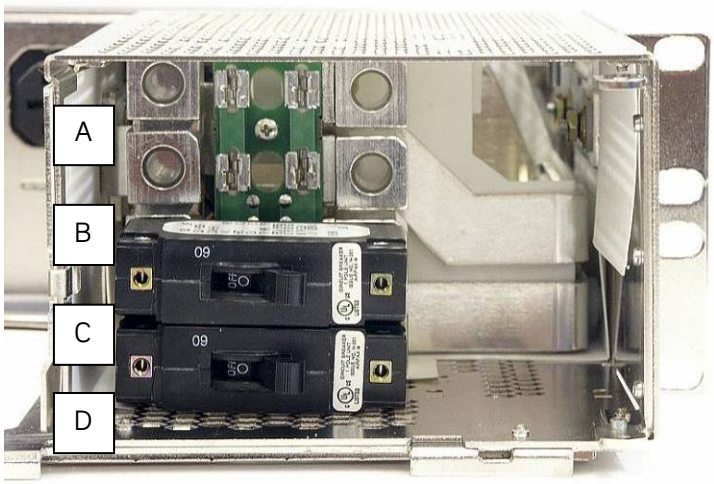


Figure 24 - Front Distribution View (Circuit 7)

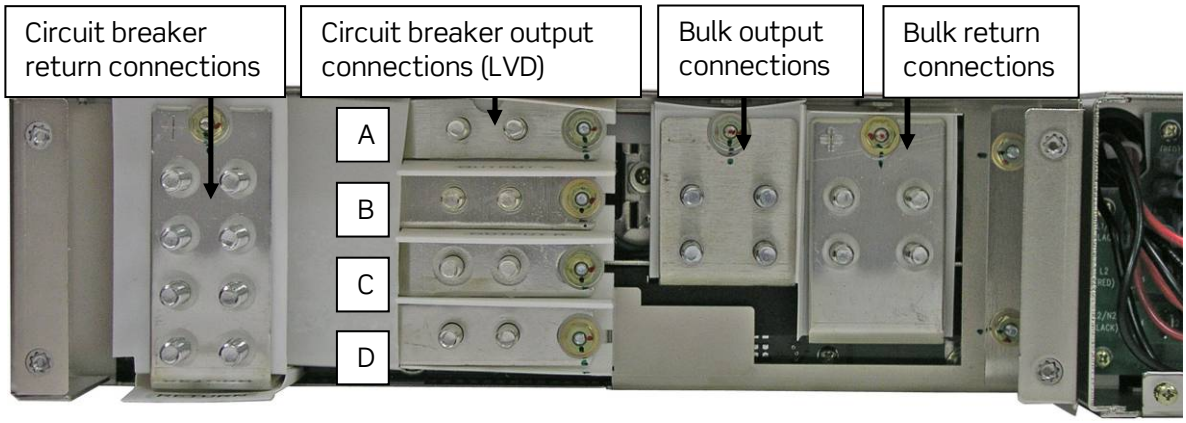


Figure 25 - Rear Distribution View (Circuit 7)

Circuit Breaker Installation

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

Circuit breakers (sold separately) are of UL-approved, bullet-nose style and slide into the breaker connection points shown in Figure 18 (Circuit 3), Figure 20 (Circuit 4), and Figure 24 (Circuit 7). Follow national, local, and company codes for sizing and installation. Breakers installed horizontally must be installed with the "line" bullet connector on the left and the "load" bullet connector on the right. "Line" and "Load" are labeled on a sticker on the side of the breaker (Figure 26).

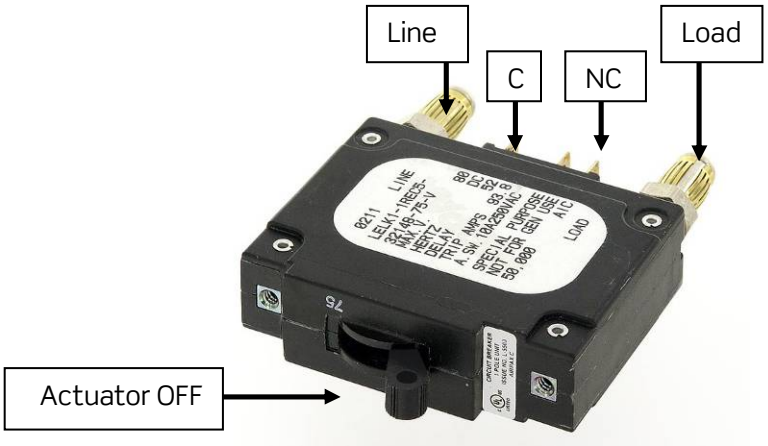


Figure 26 - Circuit Breaker Installation (Circuits 3, 4, and 7)

Breakers installed vertically in shelves like circuit 5 must be oriented as shown in Figure 27, with the **"line" bullet connector on the top** and the **"load" bullet connector on the bottom**. "Line" and "Load" are labeled on a sticker on the side of the breaker.

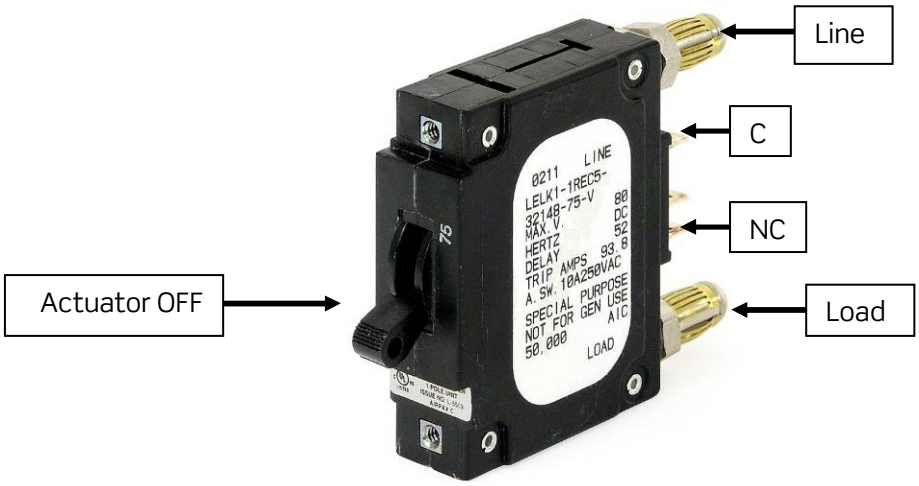


Figure 27 - Circuit Breaker Installation (Circuit 5)

If you are not using circuit breakers supplied by Eltek, the system requires UL-listed breakers with isolated auxiliary output connections. In addition, alarm contacts should short-circuit between the NC (normally closed) and C (common) connections in a tripped state.

D-subminiature Alarm Connection

Circuit 5 is equipped with a D-subminiature 25 pin, commonly referred to as a DB25, output alarm connector on the rear of the shelf. This connector mates with a Fujitsu Flashwave and provides alarms to that equipment. If the user does not have a Fujitsu Flashwave then Eltek recommends not using this connector and connecting an alarm cable directly to the controller alarm connection. See the respective controller installation and operation manual for instructions on installing an alarm cable to the controller.

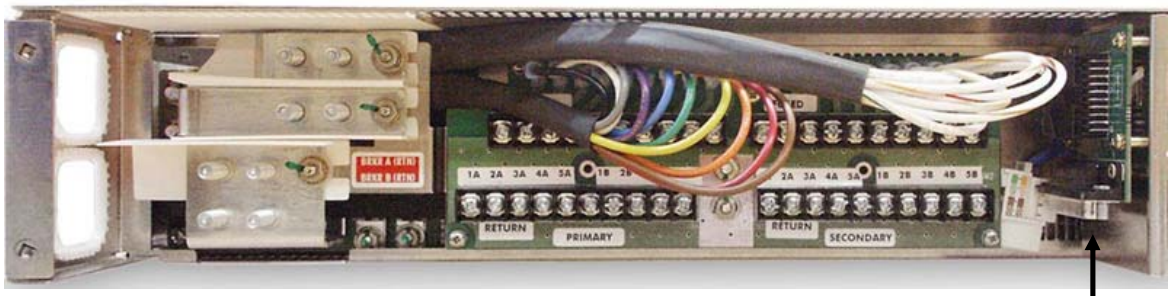


Figure 28 - DB25 alarm connector

3. Test and Turn-Up

Power up

1. After all input and output connections have been secured and checked, activate all input breakers.
2. When input breakers are on, install each rectifier sequentially by sliding the rectifier into position and closing the latch as shown in Figure 29. **Rectifier latches must be open for installation. Attempting to install rectifiers with latches closed can result in mechanical damage to the rectifiers and the shelf.** Rectifier fans will start in high-speed mode and reduce their speed according to the ambient and plant conditions within 10 seconds. As each rectifier is installed, the controller automatically identifies the new rectifier and reconfigures the system.
3. Activate all DC breakers in the system. Leaving DC breakers in the off position may cause a distribution alarm on the controller. In addition, if the system contains an LVD contactor there may be a system alarm for a short period of time until the LVD closes.
4. After all rectifiers have been installed, and if there are no alarms, the controller will display "System OK." (If there are alarms, refer to Section 5 for troubleshooting assistance.) At this time, make any adjustments to the default controller settings by following the instructions in the *Installation and Operation* manual that is shipped with the controller.
5. If no changes are necessary, the installation is complete.

NOTE: There will be an LVD alarm initially (if the optional LVD is installed), but it will clear after the pre-programmed LVD reconnect time (typically 20 seconds) has elapsed. If there are no alarms, make any adjustments to the default controller settings by following the instructions in the Installation and Operation manual that is shipped with the controller.

Figure 29 - Rectifier Insertion

4. Replacement Items

The controller, LVD and shunt (optional), and rectifiers are designed as modular, field-replaceable units. The following sections outline the procedure to replace these items.

Controller

To replace a controller module:

1. Unlatch the display by using the release on the backside of the faceplate, and remove it. The display is connected to the controller module by a ribbon cable (do not disconnect it).
2. Pull the controller module out of the shelf.
3. Align the replacement controller module and carefully insert it into the shelf. If it does not seat properly, partially withdraw the body and try again until it mates with the connector in the rear of the shelf.

   CAUTION: Using excessive force may permanently damage the communication pins or the housing on the back of the controller.

   Once properly seated, the controller turns on if the shelf is powered.
4. Install the display by hooking the bottom of the faceplate into the shelf and rocking the top back until the release snaps in place.

For settings and operation of a BC-series controller, see the controller operation manual provided with the controller unit.

Rectifiers

In the event that a rectifier needs to be removed:

1. Press the latch button on the front of the unit, and pull the handle until the unit slides out of the slot.
2. With the latch open, (Figure 29), slide the replacement unit into the open slot until it connects with the backplane.
3. After the rectifier is inserted, close the latch by pressing it.

The rectifier will power up and the controller will configure it automatically. No further setup is required.

LVD and Shunt (Optional)

It is necessary to use an insulated ratchet and socket for removing an LVD and shunt (referred to as just LVD) from a live system. Failure to use insulated

tools and take precautions while removing the LVD screws can result in serious bodily harm and damage to the shelf.

To replace the LVD, perform the following steps:

1. Remove circuit breakers from all LVD-protected positions.
2. Remove the two connection screws as shown in Figure 30 by using an insulated ratchet with a ¼ inch socket. Caution must be taken not to short-circuit the connection screws to the shelf chassis.
3. Grasp and pull the LVD plate as shown in Figure 31, until it unlatches from the backplane.
4. To reinstall a new LVD, align the slots and pins as shown in Figure 32 and push the assembly until the front edge lines up with the front surface of the chassis. Replace the LVD screws removed in step 2.

Figure 30 - Removal of the LVD Screw

Figure 31 - Removal of the LVD Plate

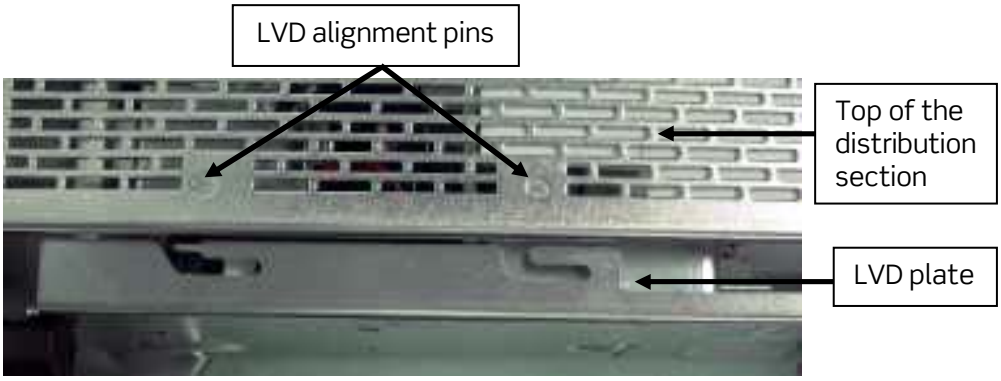


Figure 32 - Alignment of the LVD Plate with Pins

Rectifiers

To replace a rectifier, perform the following steps:

1. Press the latch button on the front of the rectifier that needs to be removed, and pull the handle until the unit slides out of the slot.
2. Open the latch of the new rectifier, and slide the rectifier into the open slot until it connects with the backplane. (See Figure 29.)
3. After the rectifier is inserted, close the latch by pressing it. The rectifier will power up and the controller will configure it automatically. No further setup procedure is required.

5. Troubleshooting

Problems and Solutions

In case of an alarm from the controller, verify the following (for details, refer to the Controller Installation and Operation manual):

- All AC and DC connections are secured properly.
- All rectifiers are installed and seated properly.
- The controller is installed and seated properly.

Follow these instructions for different scenarios:

- **AC OK off, DC OK off, ALM on or off, and display blank:** Verify that proper AC voltage has been supplied to the rectifiers being used. Refer to Table 1 for AC input voltage requirements. Reseat the rectifiers, and if problems continue, replace the rectifiers.
- **AC OK on, DC OK off, ALM LED on, and display blank:** Check DC output connections for any short circuit. Reseat the rectifiers, and if problems continue, replace the rectifiers.
- **AC OK on, DC OK on, and display blank:** For details about troubleshooting in this scenario, refer to the Controller Installation and Operation manual.

Short Circuit and Current Limit

Figure 33 represents the behavior of the output voltage in relation to the output current as load requirements exceed the ILimit setpoint. ILimit can be adjusted up to +105% of the rated current of the rectifier. The system output voltage will remain constant up to ILimit at which point it will drop quickly to 0 V, as shown in Figure 33. If the output voltage of a V rectifier drops below 12 V for more than 5 seconds, the system will shut down. The system will automatically restart after 60 seconds, and will continue to restart and shut down until the short circuit is cleared.

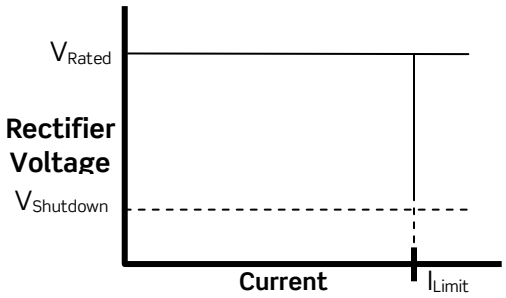


Figure 33 - Current Limit Graph

6. Installationsanleitung (German)

Eingangsspannung (Voltage):

Netzteile fuer (100 V – 240 V)	Netzteile fuer (200 V – 240 V)
V500A	V1500A
V750A	V2000A
V1000A	V2500A
V1250A	

Eingangsstrom (Current): 15 A

Eingangsleistung (Watts): 3000

Nennfrequenz (Frequency): 50/60 Hz

Modellnummer (Model No.): CKxx-xxx/CPxx-xxx

Abmessungen sind nur zur Referenz (Dimensions are for reference only.):

- Depth: 12”/30.8 cm (front access with front wire)
- Depth: 15”/38.1 cm (front access with rear wire)
- Height: 3.45”/87.6 cm
- Width: 21.45” (std. 23”)/54.5 cm or 17.45” (std. 19”)/44.3 cm

Max. Umgebungstemperatur: V2000A rectifier, full power: 65 °C/Vollast (Max operation temperature)

Ausgangsspannungen und –stöme 54 V, max 120 A (output voltage and current)

- Das Gerät darf nur in Räumen mit beschränktem Zutritt aufgestellt werden. (Nur ausgebildetes Personal) Restricted access locations only.
- Das Gerät hat keinen eigenen Ausschalter, es muß daher mit einem Ein- und Ausschalter im Versorgungskreis versehen sein. No mains ON/OFF switch is provided; disconnection means must be provided in the end-installation.
- Das Gerät hat kein Brandschutzgehäuse es darf daher nur auf nicht brennbaren Untergrund aufgestellt werden. (Beton, Metall usw.) The unit must be installed on non-combustible flooring.
- Beim Aufstellen des Gerätes ist daraf zu achten das alle Anforderungen gemäß EN60950 eingehalten werden. Installation must comply with EN60950.

7. Revision Table

Revision	Release	Description	CO
3	07/09/03	First independent manual for Compact K shelf	NA
4	07/01/04	Table added for bulk output wire sizing; added torque table; discrete sections for single and dual AC input added; rearranged controller sections	NA
5	10/18/04	Document reformatted; AC and DC lug tables added; distribution circuit 3 added; new photos added, placed in installation section; distinct controller section made	NA
6	05/04/07	Document reformatted; controller section removed due to new controller manual; updated rectifier spec tables added; DC grounding section added; installation safety section added; photos of shelf rear added; installation photos updated; description of D-sub connector for circuits 5 and 11 added; German instructions added	NA
7	11/03/09	Document reformatted; incorporated Compact P shelves; wire and breaker sizing tables removed; rectifier spec tables updated; circuit 11 removed	091102UE
8	03/04/10	Breaker caution added regarding actuator in OFF position during installation. Cover removal added to circuit 5 instructions.	100211UB
9	04/06/10	AC bus bar instructions changed to reflect dual-feed as default, with single-feed option requiring installation of bus bars. Table of torque values revised.	100223UA
10	09/03/10	Corrected max tongue widths for DC lug landings; removed “2/0” lug size from Table 5; added tongue widths to Table 5; corrected German-language instructions	100903UC
10.1	12/6/11	Add 24V rectifier information in Tables 1 – 3; updated system specifications for 24V rectifier. Added document references. Moved “Torque Settings” and “Required Tools” to “Installation” section. Updated company logo.	111108UA

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