



OPERATING MANUAL
DPP2U SERIES
DC POWER DISTRIBUTION PANELS

Manual No. DPP2U-MAN Rev. 5

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OPERATING MANUAL

DPP2U SERIES DC POWER DISTRIBUTION PANELS

1.0 INTRODUCTION

DPP2U Series circuit breaker panels provide distribution and overload protection for 1 to 20 circuits with circuit breakers that can be field installed/exchanged using a supplied puller tool. The panels are only two mounting positions (3.5 inches) high.

The panels provide up to 20 breakers single bus 450A or 10A+10B 450A+450A distribution and alarm capabilities. The A and B sections of the dual-bus panel are fully isolated, can be separately configured for 12 or 24/48 volts and are polarity neutral. Breaker capacities range from 2.5 to 200 amperes.

Breaker alarm is indicated by a dual color LED (green/red) and Form C relay contacts for each bus



Figure 1. DPP2U DC Power Distribution Panel

2.0 FEATURES

- | | |
|------------------------------------|------------------------------------|
| ◆ 48/24V and 12V or Dual Voltage | ◆ Tapered entry for easy insertion |
| ◆ POLARITY NEUTRAL | ◆ NO or NC alarm contacts |
| ◆ 450A bus bar inputs | ◆ Alarm LEDs |
| ◆ Single or Dual Feed | ◆ Power Fail form-C alarm |
| ◆ Rear panel safety cover standard | ◆ 19" & 23" mounting brackets |

3.0 PRODUCT LINE

3.1 Configurations

The following table lists the 5 available configurations of the DPP2U series.

STANDARD DUAL FEED CONFIGURATIONS

| MODEL NUMBER | VOLTS EACH FEED | INPUT FEEDS | MAX. # BREAKERS | AMPS EACH FEED | TOTAL AMPS |
|--------------|-----------------|-------------|-----------------------------|----------------|------------|
| DPP2U-A1-B1 | 48/24 - 48/24 | 2 | 10 A side & 10 B side | 450 | 900 |
| DPP2U-A6-B6 | 12 - 12 | | | | |
| DPP2U-A1-B6 | 48/24 - 12 | | | | |

OPTIONAL SINGLE FEED CONFIGURATIONS

| MODEL NUMBER | VOLTS EACH FEED | INPUT FEEDS | MAX. # BREAKERS | AMPS EACH FEED | TOTAL AMPS |
|---------------|-----------------|-------------|-----------------|----------------|------------|
| DPP2U-A1-B1-S | 48/24 | 1 | 20 | 450 | 450 |
| DPP2U-A6-B6-S | 12 | | | | |

3.2 Available Breakers ¹

| AMPS | PART NUMBER | AMPS | PART NUMBER |
|------|---------------|------------------|---------------|
| 2.5 | 348-1441-0020 | 50 | 348-1441-0500 |
| 5 | 348-1441-0050 | 60 | 348-1441-0600 |
| 10 | 348-1441-0100 | 80 | 348-1441-0800 |
| 15 | 348-1441-0150 | 100 | 348-1441-1000 |
| 20 | 348-1441-0200 | 125 ² | 775-1524-0000 |
| 25 | 348-1441-0250 | 150 ² | 775-1524-0010 |
| 30 | 348-1441-0300 | 200 ² | 775-1524-0020 |
| 40 | 348-1441-0400 | | |

NOTES:

1. Breakers need to be ordered individually and are shipped separately.
2. Require two positions. Includes paralleling bars to connect output load terminals.
3. Breakers are magnetic-hydraulic plug-in type with auxiliary contacts (Normally Open) and mid-trip function. Only the following types may be installed.

2.5A to 100A:

CBI D-Frame Series single pole, D-2A23XANBSXXXXLXB-XXXXXWDVAX2-X

or

Carling C-Series Handle single pole, CT1-B2-14-XXX-A11-MJ

125A to 200A:

CBI D-Frame Series, parallel pole, D-2A23XBNBSXXXXLAM-XXXXXWDVAX3-X

or

Carling C-Series Handle Parallel pole, CT2-P2-04-XXX-A11-MK

4.0 SAFETY & INDUSTRY STANDARDS

- 4.1** DPP2U Series power distribution panels meet the following safety requirements:

STANDARD

UL60950-1, 2nd Edition

CSA22.2 No. 60950-1, 2nd Edition

EN60950-1, 2nd Edition

- 4.2** DPP2U Series power distribution panels are CE marked to indicate conformance to the European Union's Low Voltage Directive.
- 4.3** These Distribution Panels operate at voltages that could potentially be hazardous. Furthermore, inadvertent short circuiting of the system battery and/or rectifier by mis-connection or other error could be harmful. This product should be handled, tested and installed only by qualified technical persons who are trained in the use of power systems and are well aware of the hazards involved.
- 4.4** When operating this Distribution Panels the chassis ground terminal must be connected to the system frame ground or other proper safety ground for the protection of personnel.
- 4.5** All connections to the Distribution Panels should be carefully checked for errors before applying power to them.
- 4.6** The internal voltages may be at hazardous potentials. The top cover should not be removed. There are no user-serviceable components in these units. Removing the top cover will void the warranty.

5.0 WARRANTY (summary)

DPP2U Series power distribution panels are warranted for two (2) years from date of shipment against defects in material and workmanship. This warranty does not extend to products which have been opened, altered or repaired by persons other than persons authorized by the manufacturer or to products which become defective due to acts of God, negligence or the failure of customer to fully follow instructions with respect to installation, application or maintenance.

For a complete text of UNIPOWER's warranty conditions please request a copy from your local Sales Office.

6.0 DESCRIPTION OF OPERATION

6.1 Power Distribution Circuits. A simplified schematic diagram of the distribution panels is shown in Figure 2. The battery input to each load connects to a high-current copper bus bar from which the individual fuses or circuit breakers distribute power to the loads. The return input connects to a similar bus bar to which the individual loads terminate. The A and B loads are totally independent and isolated with the exception of models incorporating the 'S' option.

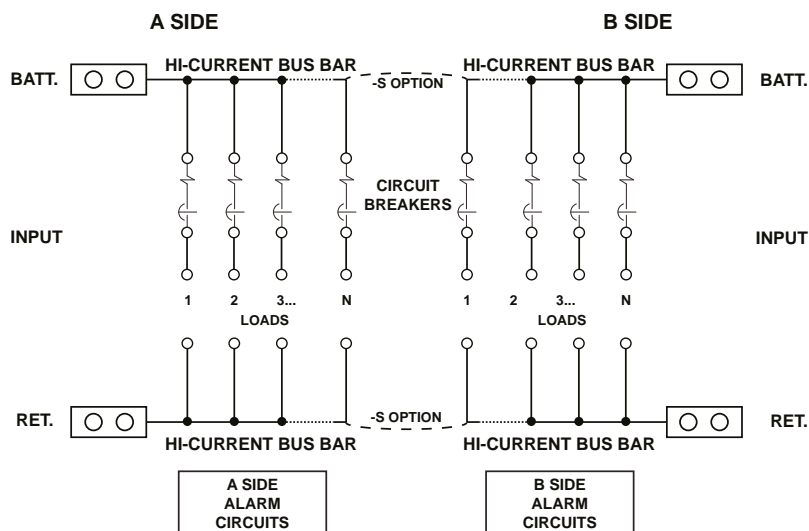


Figure 2. Block Diagram

6.2 Alarm Circuits. The alarm circuits detect a tripped circuit breaker and, in this event, turn on the red part of the LEDs. The alarm circuits also each drive Form C relay contacts. If one or more circuits open or if there is an input power failure, the relays are de-energized and the contacts are used to control external audible or visual alarms. The A and B alarm circuits are also independent and isolated from each other.

LED & RELAY STATE MEANINGS

| LED State | Relay State | Meaning |
|-----------|-----------------------------|----------------|
| Green | Energized (N.O. is closed) | OK |
| Red | De-energized (N.O. is open) | Breaker Trip |
| OFF | | No Input Power |

7.0 SPECIFICATIONS

The following specifications are typical at 25°C unless otherwise noted.

INPUT/OUTPUT

| | |
|-------------------------------|---|
| Panel Capacity | |
| @ 35°C | 450A per Bus |
| @ 40°C | 400A per Bus |
| @ 50°C | 320A per Bus |
| @ 70°C | 200A per Bus |
| Configuration | 450A Single Bus with 1 to 20 Breakers |
| | 900A Dual Bus 1 to 10 Breakers Each Bus |
| Breaker Capacity ¹ | 2.5A to 200A |
| Voltage ¹ | |
| 24/48V Version | 21-60VDC |
| 12V Version | 10.5-15VDC |
| Polarity | Neutral, Positive or Negative Ground |

ALARMS

| | |
|-----------------------|------------------------------|
| Alarm Indicator | Dual Color LED Per Bus |
| LED Status Indication | Green = Normal |
| | Red = CB Trip Alarm |
| | Off = No Power |
| Alarm Relays | Form C Contacts for each Bus |

SAFETY UL60950-1 2nd Ed., CSA22.2 No. 60950-1 2nd Ed.,
EN60950-1 2nd Ed.

ENVIRONMENTAL

| | |
|-----------------------|---------------------------|
| Operating Temp. Range | -10°C to +70°C |
| Storage Temp. Range | -40°C to + 85°C |
| Humidity | 0% to 95%, Non-Condensing |

PHYSICAL SPECIFICATIONS

| | |
|------------------------------|---|
| Case Material | Steel |
| Finish | Powder Coat Black |
| Case Dimensions, Inches (mm) | 3.45 H x 17.16 W x 5.98 D (87.6 x 435.9 x 151.9) |
| Weight (approx.) | 12.5 lbs. (5.67 kg.) |
| Rack Mounting | 19 or 23 Inch |

CONNECTIONS

| | |
|---------------------------|----------------------------------|
| Input Connections | Bus Bar |
| Output Connections | 1/4-20 Stud, 2-hole lugs |
| Chassis Ground Connection | 1/4-20 Stud, 2-hole lugs |
| Alarm Relay Connections | Spring Clamp Terminals, 16-26AWG |

Notes:

1. See ordering guide to specify.

8.0 FRONT PANEL DESCRIPTION

The front panel of the DPP2U, shown in Figure 3 below, consists of the A and B sides and a center section. The A and B sides can each accommodate up to 10 field installed/replaceable hydraulic magnetic circuit breakers rated from 2.5A to 200A. The center section has two green/red LEDs, one for the A side (left) and the other for the B side (right). At the bottom of this center section is a slot for a wallet and designator card. This card permits the recording of each output circuit by number.

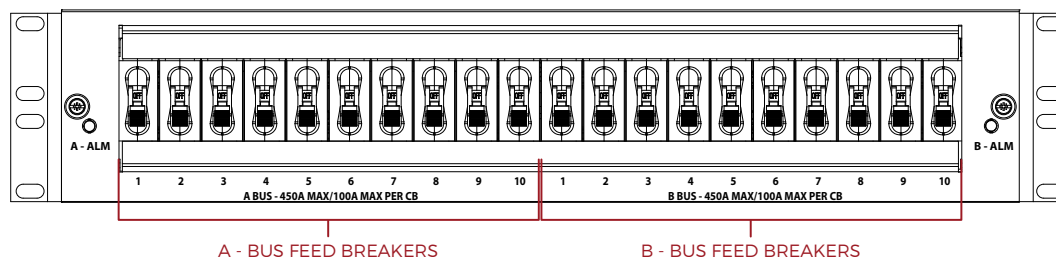


Figure 3. Front Panel View

9.0 BACK PANEL DESCRIPTION

9.1 Back View. Figure 4 shows the back of the DPP2U distribution panel. Inputs are at the left and right ends of the back panel. Side B outputs are at two rows of barrier terminal strips on the left side, and side A outputs are the same on the right side. At the center of the back panel are two spring clamp terminal blocks for the Form C relay contact outputs.

Below these is a chassis ground terminal.

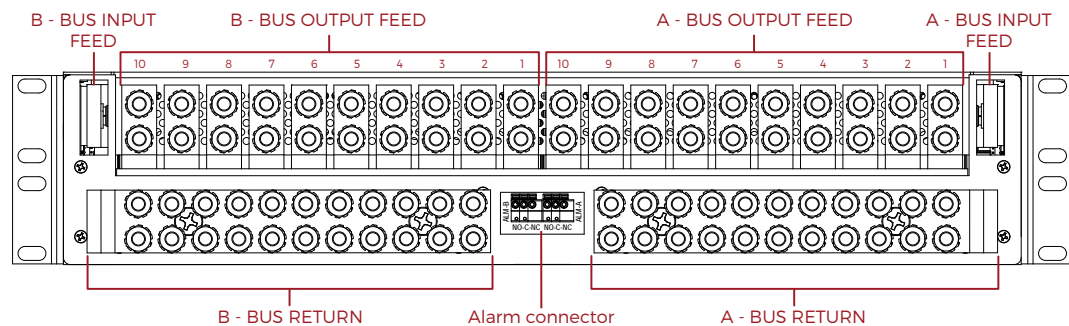


Figure 4. Back Panel View

9.2 Input Connections. See Figure 5. The DC power inputs to the distribution panel are made by means of crimp type lugs to two copper bus bars on side A and side B. The upper bus bar is the battery connection (whether + or -) and the lower bus bar is the return (whether + or -).

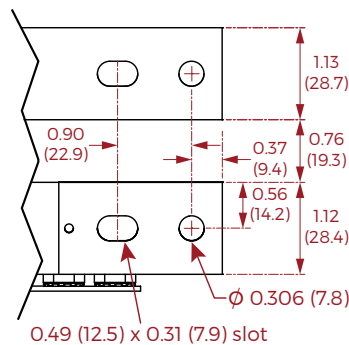


Figure 5. Input Bus Bar Detail

9.3 Recommended Input Cable Sizes and Lugs

The following table details the recommended cable size for various input current.

| MAXIMUM CURRENT | CONDUCTOR SIZE | PANDUIT CORP. PART NUMBER | TORQUE 1/4 x 20 BOLT |
|-----------------|----------------|---------------------------|----------------------|
| 450A | 350KCMIL | LCC350-14BW-X | 62 in-lbs |
| 400A | 300KCMIL | LCCX250-14B-X | 62 in-lbs |
| 320A | 4/0 AWG | LCCX4/0-14B-X | 62 in-lbs |
| 200A | 3/0 AWG | LCCX3/0-14B-X | 62 in-lbs |
| 150A | 1/0 AWG | LCCX1/0-14B-X | 62 in-lbs |

9.4 Output Connections. Output connections for A and B loads are shown in Figure 4. There are 10 sets of bus bar terminals for each side, A and B. The connections are numbered to correspond with the numbers of the front panel breakers. The upper strip connections are from the battery (FEED) through the breakers; the lower strip connections are the RETURNS. Side B is on the left and side A on the right when viewed from the rear.

All connections use 1/4-20 threaded studs and are rated up to 100 amperes. Maximum wire size is 2 AWG. UNIPOWER recommends using FLEX wire with either Panduit LCDXN2-14A-E or LCDXN2-14AF-E (90deg angle) lugs. When 125A, 150A or 200A breakers are installed two positions are utilized. Figure 6 below shows detailed spacing of the terminals.

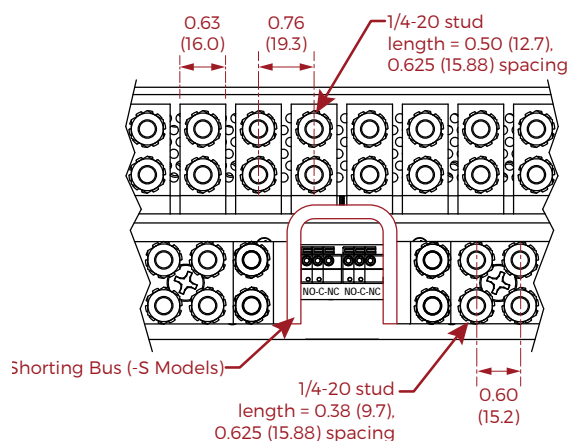


Figure 6. Output Barrier Strip Detail

The following table lists a range of cable sizes with matching lugs that will fit the output terminals. The indicated current rating is the maximum assuming that the cables are bundled/confined.

| MAXIMUM CURRENT | CONDUCTOR SIZE | PANDUIT CORP. PART NUMBER | TORQUE 1/4 x 20 BOLT |
|-----------------|----------------|---------------------------|----------------------|
| 200A (2 pos) | 3/0 AWG | LCDX3/0-14A-X | 62 in-lbs |
| 150A (2 pos) | 1/0 AWG | LCDX1/0-14A-X | 62 in-lbs |
| 125A (2 pos) | 1 AWG | LCDX1-14A-X | 62 in-lbs |
| 100A (1 pos) | 2 AWG | LCDXN2-14A-E | 62 in-lbs |
| 80A (1 pos) | 4 AWG | LCDX4-14A-L | 62 in-lbs |
| 60A (1 pos) | 6 AWG | LCDX6-14A-L | 62 in-lbs |
| 50A (1 pos) | 8 AWG | LCDX8-14A-L | 62 in-lbs |

9.5 Form C Relay Contact Outputs. The center of the back panel has connections to the Form C relay contact outputs for connection to external audible or visual alarm circuits. See Figure 7 below.

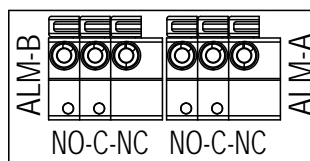


Figure 7. Alarm Connection Detail

Connection is made via two Phoenix Contact spring clamp terminal blocks. J3 is for the Form C relay contact of side B and J4 is for the Form C relay contact of side B. Terminals 1, 2 and 3 viewed from left to right are the normally open (NO) common (C) and normally closed (NC) contacts, respectively. See figure 8 below.

“Normally Closed” and “Normally Open” are defined with the distribution panel powered and providing power to all outputs, i.e., no circuit breakers tripped.

The ratings of the relay contacts are 0.6A at 125VAC or 2A at 30VDC. The spring clamp terminals accept wire sizes nos. 16 to 26 AWG.

When the input power is connected to a side (A or B), the Form C relay of that side is energized. If there is either loss of input power, one or more circuit breakers trip or the relay is de-energized, the normally open contacts close and the normally closed contacts open. See figure 8 below.

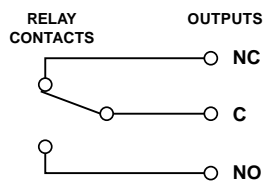


Figure 8. Form-C Relay Schematic

9.6 Chassis Ground Connection. This is located on the left side of the chassis as shown in figure 9 below and is a pair of 1/4-20 bolts.

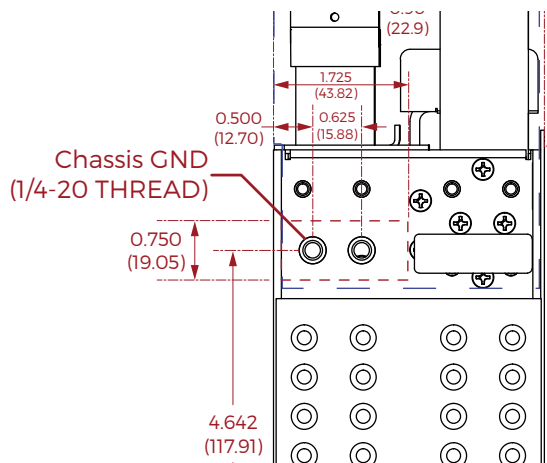


Figure 9. Chassis Ground Connection

The recommended cable size for this connection is 2/0 AWG terminated with a Panduit LCDN2/0-14A-X or equivalent lug. Torque bolts to 62 in-lbs.

NOTE THAT IT IS ESSENTIAL THAT THIS TERMINAL IS CONNECTED TO THE SYSTEM FRAME GROUND TO ENSURE SAFE OPERATION.

10.0 UNPACKING AND INSPECTION

- 10.1** This DPP2U Series power distribution panel was carefully tested, inspected and packaged for shipment from our factory. The unit and circuit breakers are shipped separately. Upon receipt of the unit it should be carefully unpacked and inspected for any damage in shipment.
- 10.2** If there is evidence of damage, do not attempt to test the unit. The freight carrier should be notified immediately and a claim for the cost of the rectifier system should be filed with the carrier for direct reimbursement. Be sure to include the model and serial number of the damaged unit in all correspondence with the freight carrier. Also save the shipping carton and packing material as evidence of damage for the freight carrier's inspection.
- 10.3** UNIPOWER will cooperate fully in case of any shipping damage investigation.
- 10.4** Always save the packing materials for later use in shipping the unit. Never ship the unit without proper packing.

11.0 INSTALLATION

- 11.1 Mounting.** This distribution panel can be mounted in either 19- or 23-inch racks by using the supplied reversible brackets. Mount it from the front of the rack using the correct offsets to align with existing rack-mounted equipment. The bracket offsets are every quarter inch from front to back.

A minimum air clearance of 1.5" above and below the unit must be maintained after installation in the rack. Care should be taken not to compromise the stability of the rack by the installation of this unit.

- 11.2 Connections.** Input connections should be made with two-terminal crimp type lugs. See Sections 9.2 and 9.3.

Connection to Supply

- Connect to a reliably grounded 12VDC to 48VDC SELV source.
- The branch circuit over-current protection shall be sized appropriate to the input current and shall not exceed 600A.
- Use minimum 350Kcm copper conductors for max. rated input current.
- A readily accessible disconnect device that is suitably approved and rated is recommended to be incorporated in the field wiring.
- To be installed in a Restricted Access Location.

NOTE: Single feed models DPP2U-A1-B1-S and DPP2U-A6-B6-S have both left and right side input bus bars fitted. It is only necessary to connect the input feed to one side for correct operation.

The unused side is directly connected to the live input feed and can be used for supplying additional panels. See figure 10 below.

CAUTION: The total load must not exceed 450A on any one pair of bus bars in the chain.

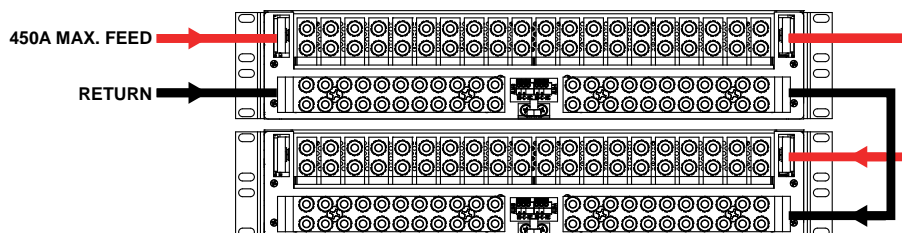


Figure 10. Series Connection of Multiple Panels

Output connections are made to individual output bus bars and common return. See Section 9.4 and Figure 6.

The Form C relay contact output connections are made to the spring clamp terminal blocks. See Section 9.5. The chassis ground connection is made to the 1/4-20 studs. See Section 9.6. This safety ground connection should be made before operating the panel.

- 11.3 Checking Connections.** Carefully check the polarity of input connections to the distribution panel and output connections to the load before operating the panel. Reverse connections will not harm the distribution panel which is POLARITY NEUTRAL but may cause serious harm to the load. Check to make sure that the chassis safety ground connection is made. Make sure that all connections are clean and secure to minimize contact resistance.
- 11.4 Rear Safety Cover.** Once all of the above have been completed, fit the clear plastic safety cover to the back of the unit using the supplied mounting studs and screws. Instruction for fitting the mounting studs the panel are included in the accessory kit.

12.0 INSTALLING CIRCUIT BREAKERS

The DPP2U Series employs pluggable circuit breakers that can be easily installed, removed or replaced using the supplied puller tools. This operation is carried out without the need to dismount the unit from its installation.

Installation, removal or replacement of a circuit breaker and connection or disconnection of a load circuit should be carried out only by only by qualified technical persons who are trained in the use of power systems and are well aware of the hazards involved.

Although it may be necessary on some occasions to carry out this operation while power remains applied to the panel, it is always preferable to switch off the power if possible before proceeding.

12.1 Removing the cover plate. To remove the cover plate undo the two knurled retaining screws at the left and right side of the unit and pull forward.

12.2 Removing a breaker or blanking panel. To remove a breaker pull the toggle switch handle using the supplied puller tool until the breaker comes free. To remove a blanking panel lever it out at the top or bottom using a flat bladed screwdriver.

12.3 Installing a breaker or blank panel. To insert a breaker carefully push the breaker firmly into the socket and make sure that it is fully seated. To fit a blanking panel use the two supplied retaining screws to fit it into position.

Repeat the above procedure from 12.2 to 12.3 for all positions and then replace the cover plate.

12.4 Conditions for breaker positioning. For thermal reasons, when operating the panel continuously at the current ratings stated in note (2) on page 15, the circuit breaker current shall not exceed the continuous rating as defined in the table.

Adjoining gaps on each side of the circuit breaker must be provided for current ratings 70A to 200A. None are required for 2.5A to 60A.

Circuit Breaker Gap Requirements

| CB Current Rating | Number Poles | Max. Continuous Load | Adjoining Gap (each side) |
|-------------------|--------------|--------------------------------------|---------------------------|
| 2.5A to 60A | 1 | 80% of CB rating (70% @ 70°C) | NO |
| 70A to 100A | 1 | 75% of CB rating (50% @ 70°C) | YES |
| 125A to 200A | 2 | 62.5% of CB rating (37.5% @ 70°C) | YES |

The above table is based on the following:

- 1) Use of Carling (C Series) breakers or CBI (D Frame) breakers. Breakers in these series are equivalent in fit, form, and function and can be used interchangeably within the same system.
- 2) The DPP2U panel is rated for continuous operation at a maximum input of 450A per side @ 35C max., 400A per side @ 40C max., 320A per side @ 50C max., and 200A per side @ 70C max.

12.5 Connecting or disconnecting load circuits. In cases where a breaker has been installed follow the instructions in section 9.4 to connect the new output wiring. Ensure that the breaker is in the OFF position until all connections have been made and thoroughly checked.

Remember that if any 125A, 150A or 200A breakers have been fitted these will require that the supplied link bar is fitted across the associated output bus bars.

Note that if power remains applied to the panel during breaker installation the alarm LED will show red and the alarm relay will be activated until the new cables have been connected and the breaker set to the ON position.

13.0 SETUP AND TESTING

- 13.1** It is not necessary to have the distribution panel mounted in a rack for initial testing. This can be done on a bench. It is also not necessary to have loads connected to the panel for this testing.
- 13.2** With the input power source off, connect the input wires to the A side of the distribution panel. Connect ground to the chassis ground terminal. Set all circuit breakers to on.
- 13.3** Turn on the input power source. The A side LED should be green. If it is red, one of the circuit breaker is tripped. If the LED is off, there is no input power to the unit. Check the output voltage at each set of output terminals with a digital voltmeter.
- 13.4** With the A side LED green, use an ohmmeter to check the Form C relay contact outputs. On J4 measure the resistance between pins 1 and 2. This should read “open”. Measure the resistance between pins 2 and 3. This should read “short”.
- 13.5** On the A side trip circuit breaker no. 1. The A side LED should turn red. On J4 measure the resistance between pins 1 and 2. This should read “short”. Measure the resistance between pins 2 and 3. This should read “open”. Reset the circuit breaker.
- 13.6** On the A side check each succeeding breaker by tripping it, and verify that the LED turns red. It is not necessary to recheck the Form C relay contacts.
- 13.7** Repeat the same tests of Sections 13.2 through 13.6 on the B side of the distribution panel, use J3 to check the Form-C relay operation.
- 13.8** The distribution panel may now be connected to its intended application.
- 13.9** If the distribution panel did not operate properly in the above tests, go back and double check the connections and the polarity of the input source to make sure it is correct.

Please note that there are no user serviceable parts inside either the modules or the shelves and that opening either will void the warranty.

Product support can be obtained using the following addresses and telephone numbers.

Corporate office:
UNIPOWER, LLC
210 N University Dr
Coral Springs, FL 33071
United States

Manufacturing facility:
UNIPOWER, LLC
65 Industrial Park Rd
Dunlap, TN 37327
United States

Manufacturing facility:
UNIPOWER Slovakia SRO
ZLATOVSKA 1279
Business Center 22
91105 Trencin, Slovakia

Phone: +1-954-346-2442

Toll Free: 1-800-440-3504

Web site – www.unipowerco.com

When contacting UNIPOWER, please be prepared to provide:

1. The product model number, spec number, S build number, and serial number
- see the equipment nameplate on the front panel
2. Your company's name and address
3. Your name and title
4. The reason for the contact
5. If there is a problem with product operation:
 - Is the problem intermittent or continuous?
 - What revision is the firmware?
 - What actions were being performed prior to the appearance of the problem?
 - What actions have been taken since the problem occurred?

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