

DC Power Distribution Panel

8120

Panel Specifications

Material	0.125" 5052-H32 aluminum alloy	
Final Panel Finish	Graphite color 2 part textured Polyurethane	
Circuit Breakers	15A single pole	
Maximum Amperage	Varies by components; busbar maximum 100A	
Voltage Rating	12V DC	
USB Charger	12/24V DC Dual USB 4.8A with intelligent device recognition (1045)	
Socket	12V DC Dash Socket 15A with watertight cap (1011)	

	Inches	Millimeters
Overall Dimensions	7.50 x 5.25	190.5 x 133.4
Mounting Centers	6.67 x 4.42	169.4 x 112.3

Applicable Standards

- American Boat and Yacht Council (ABYC) Standards and Recommended Practices for Small Craft sections: E-1, E-3, E-9.
- United States Coast Guard 33 CFR Sub Part 1, Electrical Systems.

WARNING

- ✓ These instructions are intended to provide assistance with the installation of this product, and are not a substitute for a more comprehensive understanding of electrical systems. We strongly recommend that a competent electrical professional perform the installation of this product.
- ✓ If either the panel front or back is to be exposed to water it must be protected with a waterproof shield.
- ✓ The panels must not be installed in explosive environments such as gasoline engine rooms or battery compartments as the circuit breakers are not ignition protected.
- ✓ The main positive connection must be disconnected at the battery post to avoid the possibility of a short circuit during the installation of this distribution panel.

Guarantee

Any Blue Sea Systems product with which a customer is not satisfied may be returned for a refund or replacement at any time.

Useful Reference Books

- Calder, Nigel (2005). *Boatowner's Mechanical and Electrical Manual* (3d ed). Camden, ME: International Marine / McGraw-Hill.
- Wing, Charlie (2006). *Boatowner's Illustrated Electrical Handbook* (2d ed). Camden, ME: International Marine / McGraw-Hill.

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Installation

1. Disconnect all AC and DC power

Before starting, disconnect the main positive cable from all batteries to eliminate the possibility of a short circuit while installing the distribution panel. Also disconnect the AC shore power cord from the boat to eliminate the possibility of electrocution from AC wiring in the proximity of the DC distribution panel.

2. Select mounting location and cut opening

Select a mounting location which is protected from water on the panel front and back and is not in an area where flammable vapors from propane, gasoline or lead acid batteries accumulate. The circuit breakers used in marine electrical panels are not ignition protected and may ignite such vapors.

Using the panel template provided, make a cutout in the mounting surface where the distribution panel is to be mounted. Do not yet fasten the panel to the mounting surface.

3. Install positive feed wire and negative return

Determine the positive feed (red) and negative return (black or yellow) wire size by calculating the total amperage of the circuits that will be routed through the panel. Blue Sea Systems electrical panels are rated at 100A total capacity. The positive feed wire must be sized for 3% voltage drop at the 100A panel rating or the maximum amperage that will be routed through the panel in any particular installation, whichever is less. It is recommended that the positive feed wire be sized for the full panel capacity, which, in most cases, will require at least 2 AWG wire, assuming a 10 foot wire run between the panel and the batteries in 12V systems. Refer to the Wire Sizing Chart for other situations. Remember that the length of the circuit is the total of the positive wire from the power source and the negative wire back to the DC Negative Bus. Be certain that there is a fuse or circuit breaker of the correct size protecting the positive feed wire.

4. Install branch circuit wires

Determine the proper wire size for each branch circuit using the guidelines in step 4. Verify that the standard 15A circuit breakers installed in the panel are large enough for each branch circuit. Remove and replace with a higher amperage any that are undersized.

Connect the positive (red) branch circuit wires to the load terminals of each circuit breaker.

Connect each negative (black or yellow) branch circuit wire to the DC Negative Bus. DO NOT CONFUSE THE DC NEGATIVE BUS WITH THE DC GROUNDING BUS.

5. Installation of Backlight System

Connect the yellow negative wire to the panel negative bus.

To activate the label lights by the boat's battery switch, connect the red positive wire to the DC panel positive bus.

To activate the label lights by an independent switch or breaker, connect the red positive wire to the load side of the switch or breaker.

6. Optional - install grounding system wire

The grounding wire (bare, green or green with yellow stripe and normally non-current carrying) should not be confused with the negative ground wire (black or yellow and normally current carrying).

In *Boatowner's Illustrated Electrical Handbook*, Charlie Wing identifies three purposes of DC Grounding:

1. Holding conductive housings of low voltage (under 50 volts) DC devices at ground potential by providing a low resistance return path for currents accidentally coming into contact with the device cases.
2. Providing a low resistance return path for electrical current, preventing stray currents that may cause corrosion.

Installation (continued)

3. Grounding metal electrical cases to prevent emission from inside or absorption from outside of radio frequency noise (RFI).

ABYC requires that grounding wires be sized no smaller than one wire size under that required for current carrying conductors supplying the device to which the grounding wire is connected.

A full treatment of this subject is not possible within the scope of these instructions and there is controversy surrounding the general subject of DC bonding, of which DC grounding is a component. It is suggested that installers not familiar with this subject consult one of the reference books listed elsewhere in these instructions.

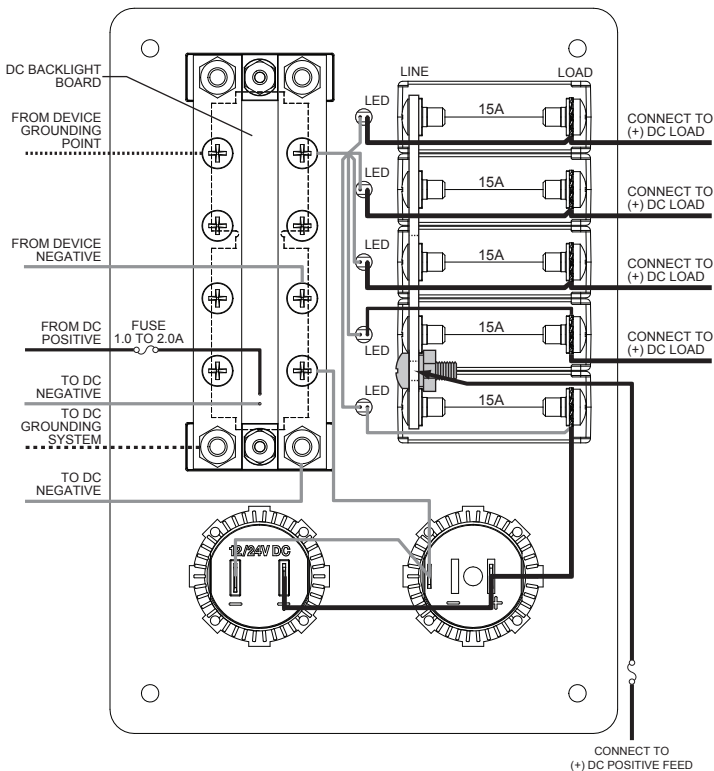
7. Apply branch circuit labels and mount panel

Apply a label for each circuit from the label set provided. If the appropriate label is not included, extended label sets are available through retail suppliers, and over 500 individual labels are available directly from Blue Sea Systems. Please go to www.bluesea.com to order labels for specific applications.

Fasten the panel to the mounting surface using the screws provided.

8. Testing

Reconnect the main positive cable to the battery terminals and turn the main switch on to supply power to the panel. Turn on all branch circuits and test the voltage at the panel. Compare this voltage to the battery terminal voltage to determine that the voltage drop is within 3%. With all branch circuits still on, test the voltage at one device on each circuit to determine that there is a 3% or 10% drop as is appropriate.



Optional Branch LEDs

This Panel is supplied with LEDs pre-installed in all optional branch positions. For future expansion of the panels remove the positive leg of the LED from the negative busbar and connect it to the load side of the corresponding branch circuit breaker.

Note

This Blue Sea Systems electrical distribution panel is furnished with 15A circuit breakers for DC branch circuits. These ratings will satisfy the vast majority of marine circuit protection situations. As shown in the Wire Sizing Chart, even 16 AWG wire, which is the minimum wire size recommended by ABYC, has an allowable amperage greater than 20A.

The Purpose of a Panel

There are five purposes of a marine electrical panel:

- Power distribution
- Circuit (wire) protection
- Circuit ON/OFF switching
- Metering of voltage and amperage (in panels with meters)
- Condition Indication (circuit energized)

Other Innovative Products from Blue Sea Systems

- 360 Panel System
- Battery Management Solutions
- AC and DC circuit protection devices
- WeatherDeck waterproof circuit breaker panels
- Fuses, fuse blocks, and BusBar
- Analog and digital meters

Wire Sizing Chart

1. Calculate the maximum sustained amperage of the circuit. Measure the length of the circuit from the power source to the load and back.
2. Does the circuit run in an **engine space** or **non engine space**.
3. Calculate **Famps** (Feet x amps). Multiply circuit length by max. current.
4. Base the wire on either the 3% or 10% **voltage drop**. In general, items which affect the safe operation of the boat and its passengers (running lights, bilge blowers, electronics) use 3%; all other loads use 10%.
5. Starting in the column which has the right **voltage drop** and **voltage drop**, run down the list until arriving at a value which is greater than the calculated **Famps**. Move left to the **Ampacity** column to verify that the total amperage of the circuit does not exceed the maximum allowable amperage of the wire size for that row. If it does, move down until the wire ampacity exceeds the circuit amperage. Finally, move left to the **wire size** column to select the wire size.

Example

- a. A 12 volt system at 10% drop with a 40' circuit x 45 amps = 1800 Famps. A wire size of 8 is required.

Wire Size	Wire Ampacity non-engine	Wire Ampacity engine	Voltage Volt Drop →	12		24		32	
				3% Famps	10% Famps	3% Famps	10% Famps	3% Famps	10% Famps
16	25.0	21.3	86	288	173	576	230	768	
14	35.0	29.8	138	459	275	918	367	1223	
12	45.0	38.3	219	729	437	1458	583	1944	
10	60.0	51.0	348	1159	695	2317	927	3090	
8	80.0	68.0	553	1843	1106	3686	1474	4915	
6	120.0	102.0	879	2929	1757	5858	2343	7811	
4	160.0	136.0	1398	4659	2796	9319	3727	12425	
2	210.0	178.5	2222	7408	4445	14815	5926	19754	
1	245.0	208.3	2803	9342	5605	18684	7474	24912	
0	285.0	242.3	3536	11788	7073	23576	9430	31434	
00	330.0	280.5	4457	14858	8915	29715	11886	39620	
000	385.0	327.3	5619	18731	11239	37462	14985	49950	
0000	445.0	378.3	7086	23620	14172	47241	18896	62988	

Note: For wire with 105°C insulation rating and AWG wire sizes.

Chart courtesy of the West Advisor