

AC Main Power Distribution Panels

PN 8099/PN 3099/PN 8199/PN 3199 AC Main + 4 Positions
PN 8412/PN 3412/PN 8512/PN 3512 AC Main + 6 Positions

Panel Specifications

Voltage Rating:	PN 8099/PN 3099/PN 8412/PN 3412 - 120 Volts AC PN 8199/PN 3199/PN 8512/PN 3512 - 230 Volts AC Panels are rated for these voltages and are so marked in order to comply with ABYC standards.	
Amperage Rating:	Panel Buses are sized for 100 Amperes of continuous current.	
Material:	0.125" 5052-H32 Aluminum Alloy	
Primary Finish:	Chemical Treatment per Mil Spec C-5541C	
Final Panel Finish:	Graphite color 2 part textured Polyurethane	
Panel Depth:	Inches 2-1/2	Millimeters 63.50
PN 8099/3099/8199/3199 Dimensions:	10-1/2 x 3-3/4	266.70 x 95.30
PN 8412/3412/8512/3512 Dimensions:	10-1/2 x 4-1/2	266.7 x 114.30
PN 8099/3099/8199/3199 Centers:	9-11/16 x 2-15/16	246.10 x 74.60
PN 8412/3412/8512/3512 Centers:	9-11/16 x 3-11/16	246.10 x 93.70

Panel Features

- PN 8099/PN 3099/PN 8199/PN 3199/PN 8412/PN 3412/PN 8512/PN 3512
 - **CE** marked, Complies with European Standards
- PN 8099/PN 3099/PN 8412/PN 3412 - 120 Volt AC
 - One double-pole 30 Ampere main circuit breaker
 - Four 15 Ampere branch circuit breakers
- PN 8199/PN 3199/PN 8512/PN 3512 - 230 Volt AC
 - One double-pole 16 Ampere main circuit breaker
 - Four 8 Ampere branch circuit breakers

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⚠ WARNING ⚠

- ✔ It is not possible within the scope of these instructions to fully acquaint the installer with all the knowledge of electrical systems that may be necessary to correctly install this product. If the installer is not knowledgeable in electrical systems we strongly recommend that an electrical professional be retained to make the installation.
- ✔ 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 gas engine rooms or battery compartments as the circuit breakers are not ignition proof.
- ✔ The vessel's shore power cord must be disconnected from shoreside power before installing this electrical panel.
- ✔ If an inverter is installed on the vessel its power leads must be disconnected at the battery before the panel installation. Be aware that many inverters have a "sleep mode" in which their voltage potential may not be detectable with measuring equipment.
- ✔ If an AC Generator is installed aboard it must be stopped and rendered inoperable before the panel is installed.
- ✔ Verify that no other AC source is connected to the vessel's wiring before the panel is installed.

Guarantee

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

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Installation

1. Disconnect all AC and DC power

Disconnect all AC power originating on or off the vessel. This includes inverters, generators, shore power attachments and any other device capable of supplying AC power to the ship's circuits.

Disconnect the main positive DC cable from all batteries to eliminate the possibility of a short circuit and to disable the inverter while installing the distribution panel.

2. Optional - install label back lighting kit

If the optional backlighting kit has been purchased (PN 8065, 2 Req.), install it according to the instructions included with the backlighting kit.

3. Select mounting location and cut opening

If this panel is to serve as your main shore power disconnect circuit breaker, select a location which is not more than 10 feet from the shore power inlet or the electrical attachment point of a permanently installed shore power cord as measured along the conductors of the feed wires. If it is more than 10 feet additional fuses or circuit breakers must be installed within 10 feet of the shore power inlet.

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 cut out in the mounting surface where the distribution panel is to be mounted. Do not yet fasten the panel to the mounting surface.

4. Install branch circuit wires

Determine the proper wire size for each branch circuit using the chart

below. Verify that the standard circuit breakers installed in the panel are correct for each branch circuit. Remove and replace any that are incorrectly sized. The circuit breaker must have a rating less than the allowable amperage of the wire, yet greater than the circuit's continuous current.

Connect each branch circuit hot (black) to the appropriate load terminal. Connect each branch circuit neutral (white) to one of the screws on the neutral bus. Connect each branch safety ground wire (green) to one of the screws of the safety ground bus.

Do not confuse the neutral current carrying wires (sometimes called ground) with the green normally non-current carrying wires (sometimes called grounding). These two wires must be connected only at the source of power, nowhere else.

Wire sizing chart

Use the wire sizing chart below to determine the proper branch and feed circuit wire sizes.

Allowable Amperage of Conductors

Wire Size (AWG)	Outside Engine Spaces	Inside Engine Spaces
16	25.0	21.3
14	35.0	29.8
12	45.0	38.3
10	60.0	51.0
8	80.0	68.0
6	120.0	102.0
4	160.0	136.0
2	210.0	178.5

Note: This chart assumes wire with 105°C insulation rating and no more than 2 conductors are bundled.
Not suitable for sizing flexible shore power cords.

Installation (continued)

5. Install feed circuit wires

Install the feed wires from the shore power inlet or other AC source, referring to the wire sizing chart to select the correct wire size. Connect the black AC hot, white AC neutral and green AC safety ground as shown in the illustration.

If the feed wires are from the shore power inlet or the electrical attachment point of a permanently installed shore power cord and the inlet or attachment point is more than 10 feet from this panel, an additional fuses or circuit breakers must be installed within 10 feet of the shore power inlet. The measurement is made along the conductors.

6. Apply branch circuit labels and mount panel

Apply a label for each of the branch circuits from the 30 basic labels provided. If the appropriate label is not included, the Extended Label Set of 120 labels may be ordered from your marine supplier (PN 8067). Individual labels are also available from Blue Sea Systems for specific applications. Refer to the label order form for a complete listing of individual labels.

Fasten the panel to the mounting surface using the panel mounting screws supplied with the panel.

7. Testing

- ✓ Connect the vessel's shore power and verify the Reverse Polarity light is not illuminated. If the red Reverse Polarity light is on then either the hot and ground or the hot and neutral wires have been crossed. Starting at the panel, trace the connections back as far as necessary to locate the error.
- ✓ Using a multimeter where the power source is connected to the panel verify:
 - PN 8099/PN 3099/PN 8412/PN 3412 - 120 Volt AC
 - a. 120 volts between hot and neutral (nominal, this may vary depending on source voltage)
 - b. 120 volts between hot and ground.
 - c. 0 volts between neutral and ground.
 - PN 8199/PN 3199/PN 8512/PN 3512 - 230 Volt AC
 - a. 230 volts between hot and neutral (nominal, this may vary depending on source voltage)
 - b. 230 volts between hot and ground.
 - c. 0 volts between neutral and ground.
- ✓ Turn on each branch circuit to verify power to each circuit.

Note

All Blue Sea Systems' AC electrical distribution panels are furnished with 15 amp or 8 amp circuit breakers for branch circuits. 15 amp circuit breakers are used in all 120 volt panels and 8 amp circuit breakers are used in all 230 volt panels. These ratings were selected to minimize the need for removing the panel's circuit breakers and reinstalling different size circuit breakers. It is very rare to have more than this amount of current flowing in any one circuit. Therefore, these circuit breakers will satisfy the vast majority of marine circuit protection situations.

The Purpose of a Panel

There are six purposes of a marine electrical panel:

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

Applicable Standards

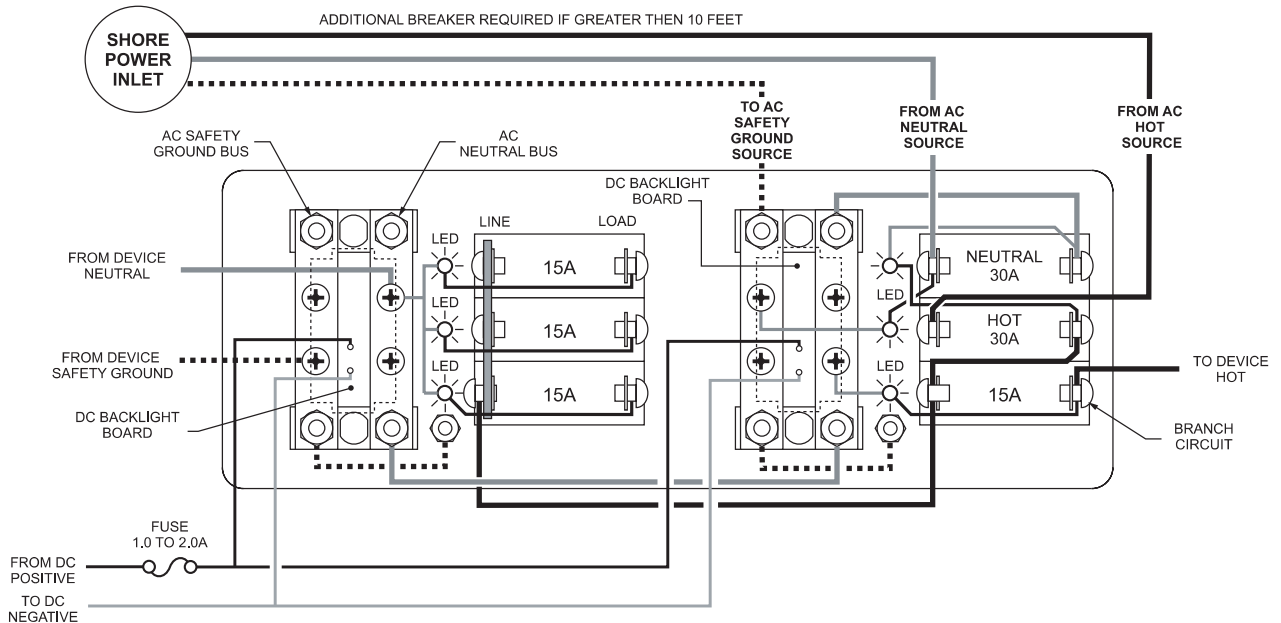
- American Boat and Yacht Council (ABYC) Standards and recommended Practices for Small Crafts sections: E-8, Alternating Current Electrical Systems on Boats.
- United States Coast Guard Code of Federal Regulations 33, Part 183, Subpart I, Electrical Systems on Boats.

Related Products from Blue Sea Systems

- High Amperage Fuses and Circuit Breakers for positive feed wires
- High Amperage Battery Switches
- Terminal Blocks and Common Bus Connectors
- AC Distribution Panels
- DC Distribution Panels
- AC and DC Digital and Analog Voltmeters and Ammeters

Useful Reference Books

- Calder, Nigel, 1996: *Boatowner's Mechanical and Electrical Manual*, 2nd edition, Blue Ridge Summit, PA: TAB Books, Inc.
- Wing, Charlie, 1993: *Boatowner's Illustrated Handbook of Wiring*, Blue Ridge Summit, PA: TAB Books, Inc.



Wiring Diagram
AC Power Distribution Panel
(PN 8099 / PN 3099 shown for reference)