

DC Power Distribution Panel with USB Charging

8421 (white) / 8521 (black) Water-Resistant Contura Panels

Panel Specifications

Material	0.100" 5052-H32 aluminum alloy	
Primary Finish	Chemical treatment per MIL SPEC C-5541C	
Final Panel Finish	White/Black color 2 part textured Polyurethane	
USB Charger	4.8A dual USB Type A with intelligent device recognition (1039)	
Switches	Contura Water-Resistant (5 positions)	
Circuit Breaker	Push Button Reset-Only Circuit Breakers (5 positions)	
Amperage Rating	Switch and Circuit Breaker, 20A @12V DC, 15A @ 24V DC	
Cumulative Rating	45A	
Voltage Rating	Panels are rated for 12V or 24V DC	
Circuit Indicator	LED embedded in switch, rated 100,000 hour 1/2 life	
	Inches	Millimeters
Panel Depth	2.75	69.90
Overall Dimensions	4.50 x 7.5	114.3 x 190.5
Mounting Centers	3.67 x 3.34	93.2 x 84.7

Regulatory

CE marked



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 (panels with meters)
- Condition indication (circuit energized)

980037760 Rev.001



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 the panel front is to be exposed to water it must be properly sealed to the instrument panel surface. The included gasket must be in place and the panel hold down screws tight.
- ✓ The panels must not be installed in explosive environments such as gasoline engine rooms or battery compartments as the switches 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.

Other Innovative Products from Blue Sea Systems

- Custom 360 Panels
- Battery management solutions
- AC and DC circuit protection devices
- WeatherDeck™ Waterproof Panels
- Fuses, fuse blocks, and busbars
- 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. Decide whether the circuit runs in an **engine space** or **non engine space**. Engine spaces are assumed to be at 50 degrees C, non engine spaces are assumed to be at 30 degrees C.
3. Multiply the maximum current times the length of the circuit to calculate **Famps** (Feet x amps).
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 and distribution panel supply circuits) use 3%; all other loads use 10% (cabin lights, bait pumps).
5. Starting in the column which has the right **voltage** and **voltage drop** shown at the top, run down the list of numbers 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.

Examples

- a. A 12 Volt system at 10% drop with a 40' circuit x 45 Amps = 1800 Famps. A wire size of 8 is required.
- b. A 24 Volt system at 3% drop with a 10' circuit x 100 A mps = 1000 Famps. A wire size of 6 is required.

Wire sizing chart

Use the wire sizing chart below to determine the minimum branch circuit wire sizes.

Wire Size AWG	Metric*	Minimum Acceptable CM area	Wire Ampacity non-engine	Wire Ampacity engine	12 Volts Volt Drop		24 Volts Volt Drop		32 Volts Volt Drop	
					3% Famps	10% Famps	3% Famps	10% Famps	3% Famps	10% Famps
16	1	2336	25.0	21.3	86	288	173	576	230	768
14	2	3702	35.0	29.8	138	459	275	918	367	1223
12	3	5833	45.0	38.3	219	729	437	1458	583	1944
10	5	9343	60.0	51.0	348	1159	695	2317	927	3090
8	8	14810	80.0	68.0	553	1843	1106	3686	1474	4915
6	13	24538	120.0	102.0	879	2929	1757	5858	2343	7811
4	19	37360	160.0	136.0	1398	4659	2796	9319	3727	12425
2	32	62450	210.0	178.5	2222	7408	4445	14815	5926	19754
1	40	77790	245.0	208.3	2803	9342	5605	18684	7474	24912
0	50	98980	285.0	242.3	3536	11788	7073	23576	9430	31434
00	62	125100	330.0	280.5	4457	14858	8915	29715	11886	39620
000	81	158600	385.0	327.3	5619	18731	11239	37462	14985	49950
0000	103	205500	445.0	378.3	7086	23620	14172	47241	18896	62988

Note: This chart assumes wire with 105°C insulation rating and AWG wire sizes.

*Metric wire sizes may be used if of equivalent circular mil area.

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 not in an area where flammable vapors from propane, gasoline or lead acid batteries accumulate. This panel is 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.

3. Select positive feed wire

Determine the positive feed (red) wire size by calculating the total amperage of the circuits that will be routed through the panel. Blue Sea Systems water-resistant electrical panels are rated at 45 amp total capacity. The positive feed wire must be sized for 3% voltage drop at the 45 amp 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 8 AWG wire, assuming a 10 foot wire run between the panel and the batteries in 12 volt 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 LED negative feed wire

Use a 16 AWG wire to connect the LED negative feed (yellow) wire to the DC Negative Bus.

5. Install branch circuit wires

Determine the proper wire size for each branch circuit using the guidelines in step 3. Verify that the standard 15 amp circuit breakers installed in the panel are large enough for each branch circuit. Remove and replace with a higher amperage any that are undersized (15 amp maximum for 24 volt or 20 amp for 12 volt systems). Connect a positive (red) branch circuit wire to the load terminal of each switch. Connect each negative (yellow) branch circuit wire to a DC Negative Bus such as Blue Sea Systems BusBar PN 2301 or MiniBus PN 2304.

6. Apply branch circuit labels

For each branch circuit, select a label from the 60 basic labels provided, and apply it to the recessed area on the front of the panel.

7. Mount Panel with water-resistant gasket

A gasket has been included for sealing the panel against the mounting surface. The gasket will easily stretch around the panel when applied from the front. Place the gasket between the panel and the mounting surface. Make sure all surfaces are clean and free from debris.

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

8. Testing

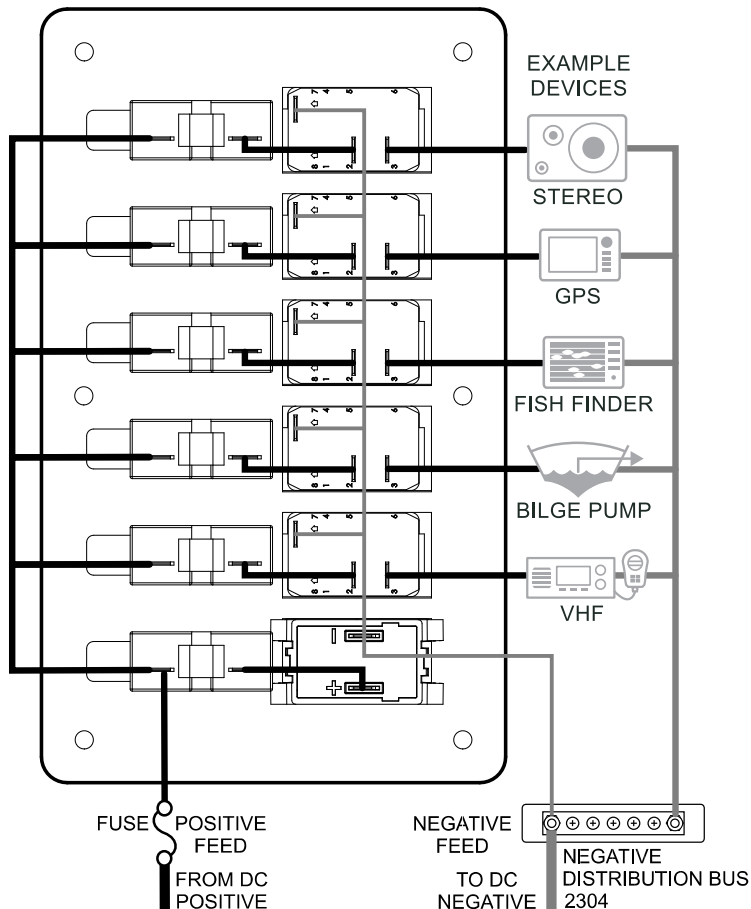
Reconnect the main positive cable to the battery terminals and turn the main switch on to supply power to the panel. Turn on all branch circuits and test the voltage at the panel. Compare this voltage to the battery terminal voltage to determine that the voltage drop is within 3%. With all branch circuits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

Note

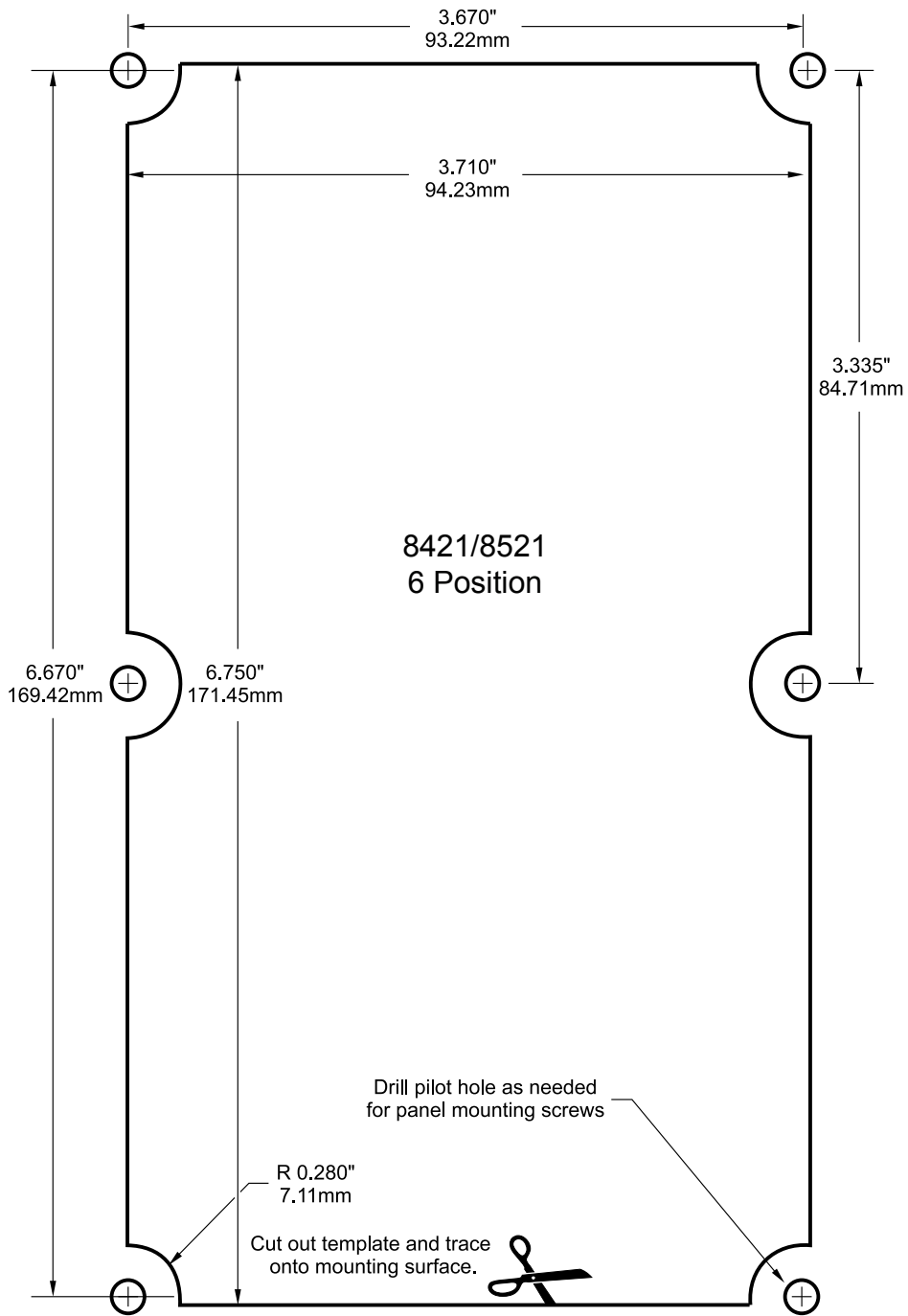
This Blue Sea Systems water resistant electrical distribution panel is furnished with 15 ampere push button circuit breakers. This rating was selected to minimize the need for removing the circuit breakers and reinstalling different size circuit breakers. 15 ampere circuit breakers will satisfy the vast majority of marine circuit protection situations.

Applicable Standards

- American Boat and Yacht Council (ABYC) Standards and Recommended Practices for Small Craft sections: E-9.
- United States Coast Guard Code of Federal Regulations 33, Part 183, Subpart I, Electrical Systems on Boats.



Wiring Diagram



THIS TEMPLATE HAS BEEN PROVIDED TO HELP YOU INSTALL YOUR NEW BLUE SEA SYSTEMS WATERPROOF POWER DISTRIBUTION PANEL.

CUTOUT TEMPLATES INCLUDED LARGE AND SMALL PANELS.

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