

BLUE SEA SYSTEMS



INNOVATIVE MARINE ELECTRICAL PRODUCTS 2007





We Make It Easy to Do Business with Us

1

Fast, dependable delivery

Blue Sea Systems is ranked among the top 5% of marine manufacturers for rapid order shipment and high fill rates by marine industry customers.

2

A staff of engineers and fellow boaters are available for support

Call Blue Sea Systems during regular business hours (Monday - Friday 7:00 am - 5:00 pm Pacific Standard Time) and our receptionist will be happy to direct you to the right person for technical support. Go to www.blueseasea.com for current specifications and product information as well as ABYC Standards, Application Briefs, Glossary of Terms, Technical Briefs, and Instructions for all Blue Sea Systems' products. Access to Blue Sea Systems' technical staff, combined with the website, ensure industry-leading support for your needs.

3

Blue Sea Systems stands behind its product for as long as you own it

Customers deserve reliable, well built products that will last in the harsh marine environment. If there is a problem with any Blue Sea Systems' product, please call 1-800-222-7617 for a solution.

What Makes Blue Sea Systems Different?

Experience

The company is comprised of avid boaters with decades of experience in craft ranging from runabouts to blue water cruising sailboats.

The engineering staff applies their previous experience designing test equipment, medical lasers, high amperage bus systems, circuit breakers, and marine systems to the Blue Sea Systems' products they design.



Load Testing

Innovation

As an independent company, Blue Sea Systems is nimble, flexible, and responsive to customer needs and changes in the marine industry.

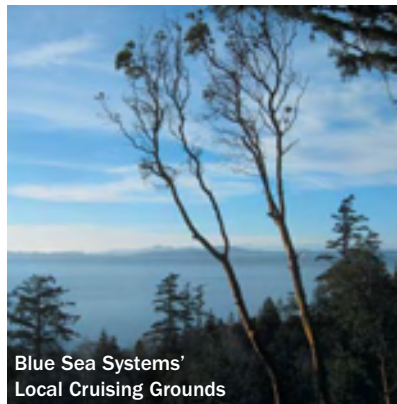


Quality

The company boat, a 36' Express Trawler, is used to test Blue Sea Systems' products and ideas and improve the products offered. Blue Sea Systems' in-house lab is used to load test, thermal test, and water test products to ensure they will perform under marine conditions. This results in the delivery of innovative, reliable products for the marine industry.

Blue Sea Systems uses tin-plated pure CDA 11000 electrical-grade copper where appropriate, rather than the lower cost brass alloys used by some manufacturers. Just as electrical wire is always copper, so are the Blue Sea Systems' products to which this wire is attached. Copper is 250% more conductive than brass. Electrical devices made with copper are capable of handling higher amperages at lower temperatures. Blue Sea Systems' tin-plating adds additional performance by protecting the copper from corrosion that can produce poor conductivity at connection points.

Plated brass can look just like tin-plated copper. Look for the Blue Sea Systems' tin-plated copper icon which assures that the product to which it is attached is made of pure electrical grade copper.



Blue Sea Systems' Local Cruising Grounds

Contact

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If you wish to subscribe to Blue Sea Systems' eNewsletter, Circuit Solutions, please send an e-mail to listmaster@blueseasea.com with the word SUBSCRIBE as the subject.

How to Use This Catalog

Products in this catalog are organized by:

- Application—for example, DC Main Power Distribution: battery switches, automatic charging relays, switch panels, and solenoids.
- Category—for example, there is one section for battery switches and one section for circuit breakers.

Finding a product from the main table of contents (page 2)

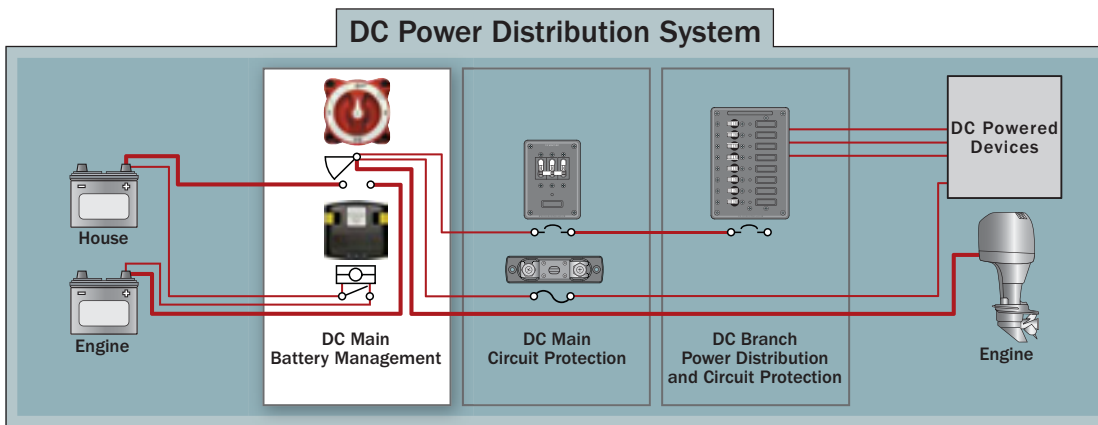
Catalog sections are shown in the Product by Application table of contents on the right side of page 2. Each section is color coded. This color coding begins in the Product by Application table of contents, carries through the product matrix on page 3, and on to the tabs on the edge of the page and back cover. Use these convenient tabs to facilitate quick access to products in the catalog.

The product matrix provides pictures of representative products in each product category. Use these product pictures to identify the products you are looking for.

Products and corresponding pages are also listed in a Product by Category table of contents on the left side of page 2.

Finding a product from the section table of contents within one of the eleven sections

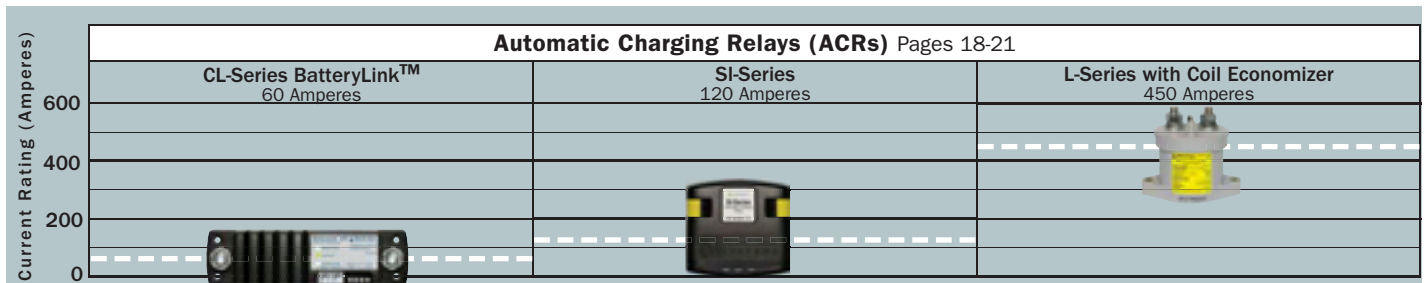
Each section of the catalog starts with a high-level diagram of the circuit. The major components of each circuit are presented in sections of this diagram. The components presented in the section of the catalog are highlighted. Below the circuit diagram, there is a brief definition, purpose, and summary of products in the section.



Pictorial presentation of products

The names we use to describe a product may not be the same as the names you use. There are representative pictures of all products to help you identify the specific product you are looking for. Product pictures are provided in the catalog index on page 3, at the beginning of each section, and on each product page.

Where products are available according to the current ratings, they are presented as each relates to the other products in the category.



Part number index

If you want to find a product and know the product part number (PN), use the PN Index on pages 126-128.

Icons

Look for these icons in product descriptions. They provide useful information:

IP – Ignition protection

NEW PRODUCT – Products that are introduced in this catalog

UPDATED PRODUCT – Products that are updated from previous products



– Products that use tin-plated pure CDA 11000 copper

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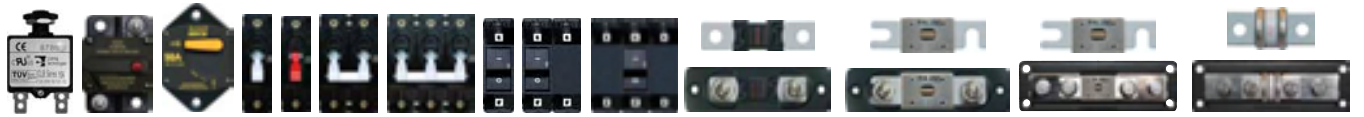
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DC MAIN BATTERY MANAGEMENT



DC MAIN CIRCUIT PROTECTION



DC BRANCH POWER DISTRIBUTION AND CIRCUIT PROTECTION



AC MAIN POWER DISTRIBUTION AND CIRCUIT PROTECTION



AC MAIN SOURCE SELECTION



AC BRANCH POWER DISTRIBUTION AND CIRCUIT PROTECTION



AC/DC COMBINATION PANELS AND CIRCUIT PROTECTION



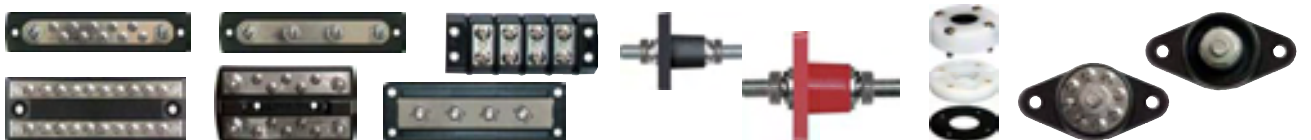
PANEL ACCESSORIES



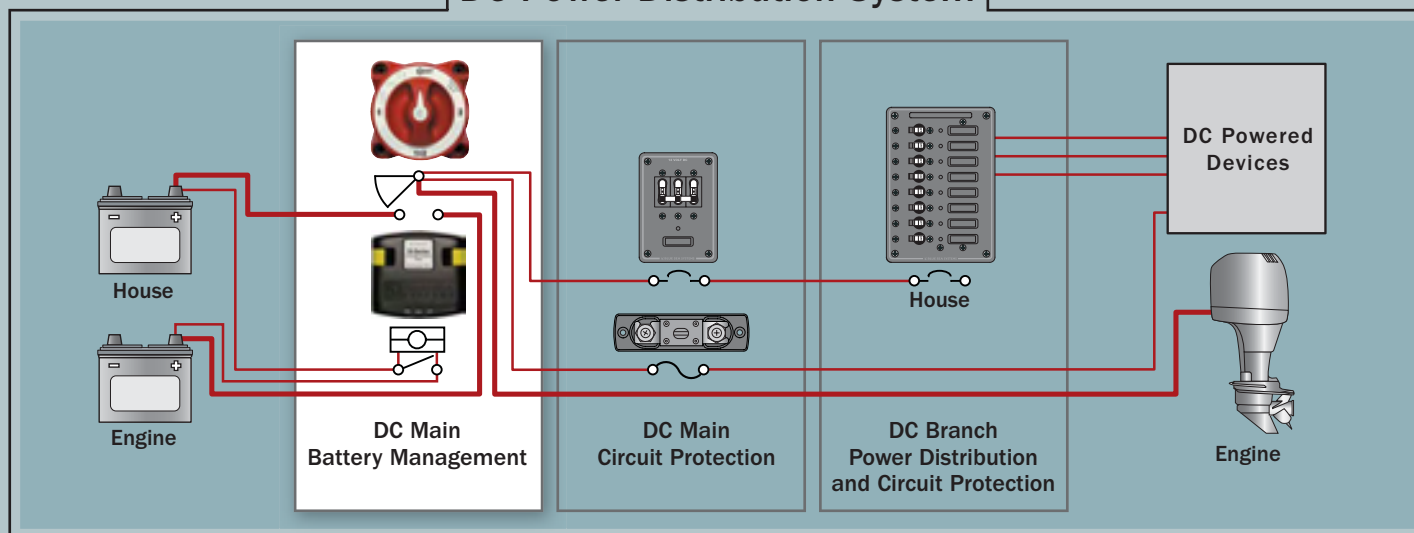
METERING AND ACCESSORIES



BUSBARS • CONNECTORS • INSULATORS



DC Power Distribution System



DC Main Battery Management

Definition

The DC Main battery management system controls the energy stored in the battery banks to ensure sufficient power for the ship's loads (including starting). It consists of battery switches that direct the power from the battery banks to the DC Main circuit protection. It also includes charge management devices that distribute charging source energy to the battery banks.

Purpose

Battery switches isolate the potentially destructive energy in the battery banks when the boat is not in use or in emergencies. When there are multiple battery banks, they determine which battery banks are connected. Blue Sea Systems provides mechanical battery switches, and electronic solenoid switches that function remotely. Multiple battery switches can be combined in panels to provide easy installation.

Charge management devices such as automatic charging relays (ACR) provide an automated means of combining two battery banks when charging, while keeping the battery banks isolated from each other when the charging source is not present.

Products in this Section

Battery Switches: Blue Sea Systems' three product lines of battery switches provide continuous current ratings from 300 to 600 Amperes. They are available in: ON/OFF, Selector, Dual Circuit™, and Dual Circuit Plus™ models. All battery switches are ignition protected, UL Marine Listed, CE marked, and meet ABYC requirements. All have tin-plated copper terminal studs for maximum conductivity and corrosion resistance. They are designed for convenient installation and ease of use.

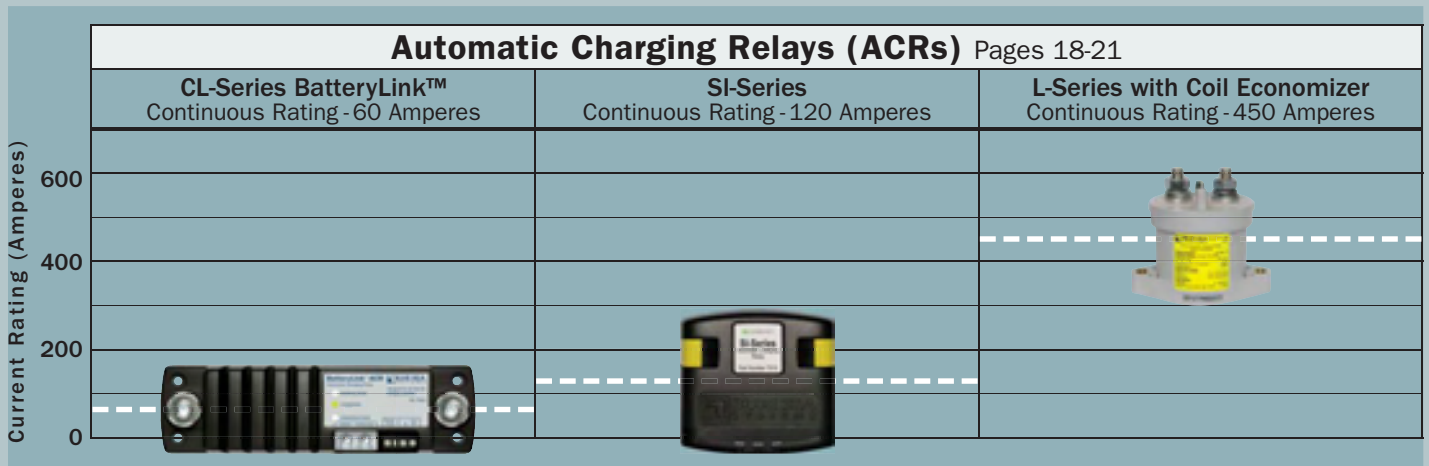
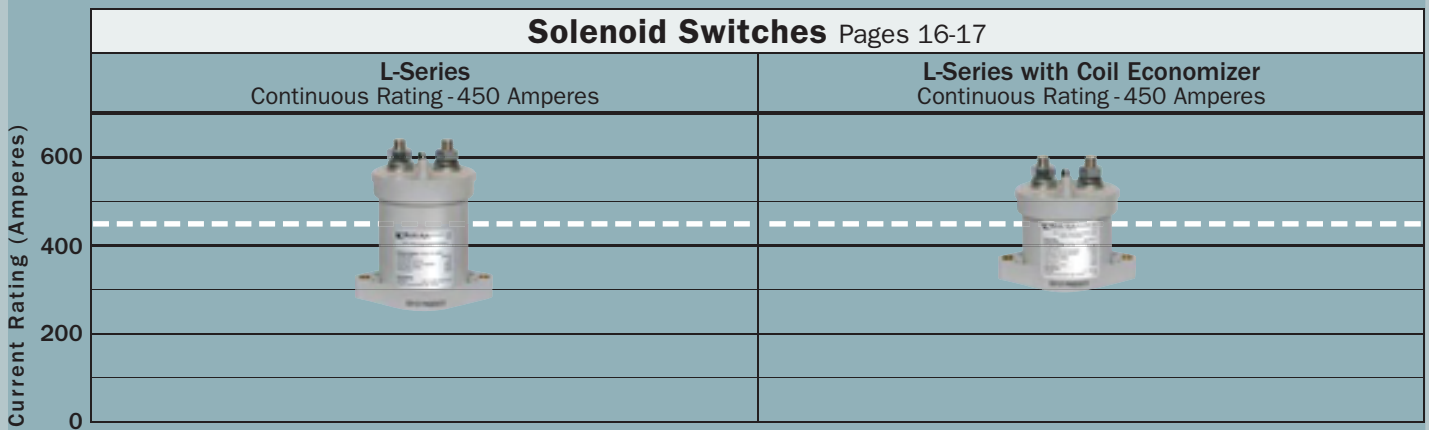
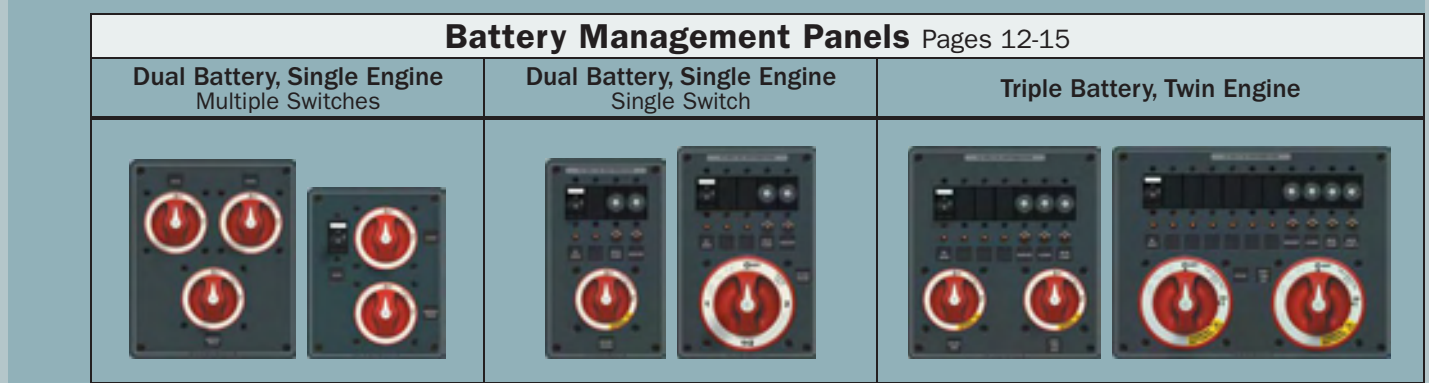
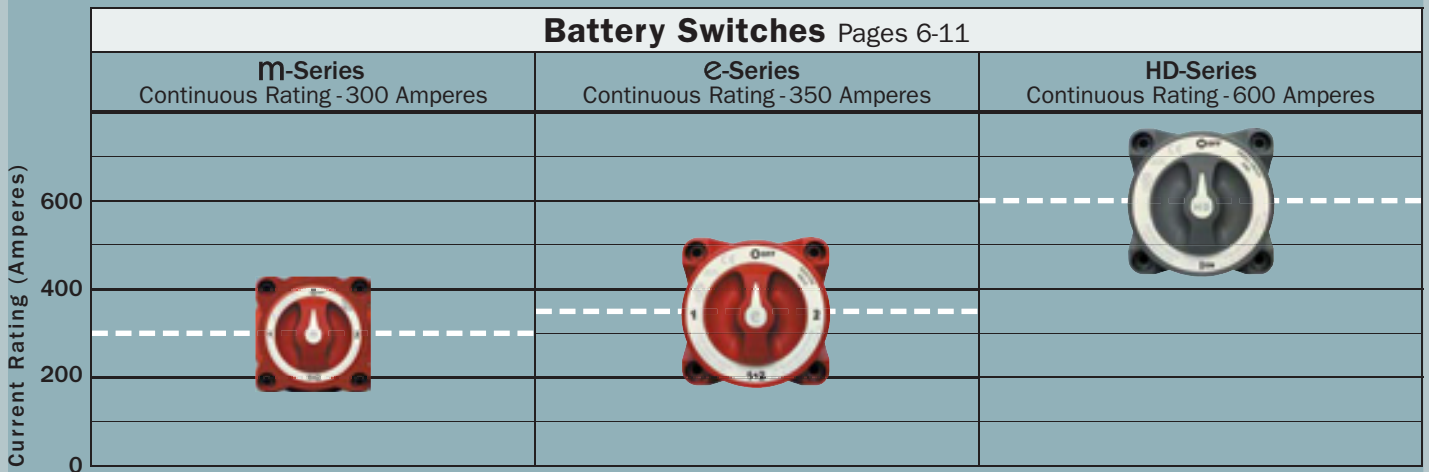
Solenoid Switches: Solenoids can function as remote battery switches. They are available with a continuous current rating of 450 Amperes and are designed for 12, 24, or 12/24 Volt systems. All solenoid switches are ignition protected, CE marked, and meet ABYC requirements.

DC Battery Management Panels (switch panels and main distribution panels): Switch panels are available for dual-battery single-engine systems, and triple-battery twin-engine systems. Main distribution panels provide DC Main circuit protection and 24-hour circuit protection. DC battery management panels simplify battery switch operation and isolate start circuits from house circuits.

Automatic Charging Relays (ACR): ACRs automatically allow a second battery to be charged from a single charging source. They do this by combining battery banks during charging, and isolate them under discharge. Models are available in continuous current ratings of 60, 120, and 450 Amperes, are ignition protected, CE marked, and meet ABYC requirements.

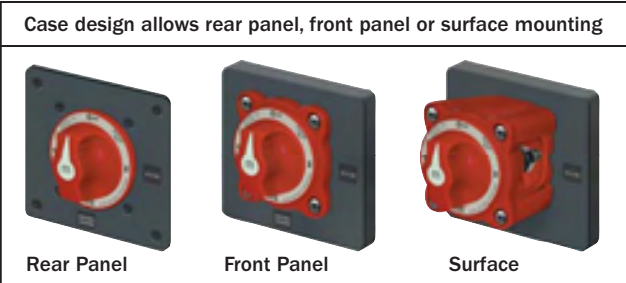
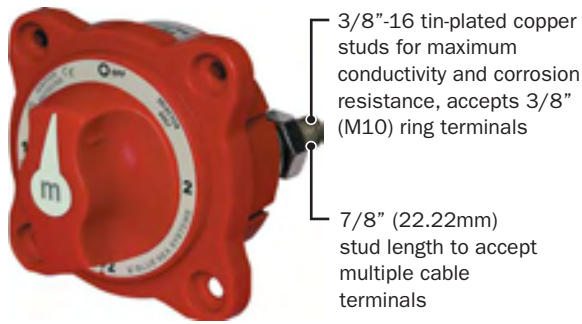
For more information about DC main battery management, refer to pages 110-112 in this catalog.

DC MAIN BATTERY MANAGEMENT



M-Series Battery Switches (mini)

300 Amperes Continuous Rating for outboards and small inboard gasoline engines



- Ideal for marine or RV applications
- Ignition protected - safe for installation aboard gasoline powered boats
- Make-before-break contact design on 6007 model allows switching between battery banks without power interruption
- Meets American Boat and Yacht Council (ABYC) requirements for battery switches

Specifications

	6005-6007	6010-6011
Inrush Rating: .25 sec (10 repeats)*	1,500 Amperes DC	1,200 Amperes DC**
Cranking Rating: 9.75 sec (10 repeats)*	700 Amperes DC	600 Amperes DC**
Intermittent Rating: 5 min (UL 1107)	500 Amperes DC	450 Amperes DC**
Continuous Rating: (UL 1107)	300 Amperes DC	300 Amperes DC**
Maximum Voltage Rating	48 Volts DC	32 Volts DC
Terminal Stud Size	3/8"-16 (M10)	3/8"-16 (M10)
Terminal Stud Torque	140 in-lb (15.82 N·m)	140 in-lb (15.82 N·m)
Cable Size to Meet Ratings***	4/0 AWG (95mm ²)	4/0 AWG (95mm ²)
Cable Clearance For 4/0 Cables	1.12" (28.4mm)	1.12" (28.4mm)
Case Material	Reinforced Polycarbonate	Reinforced Polycarbonate

Certifications

- CE marked
- UL Listed - UL 1107 electric power switches

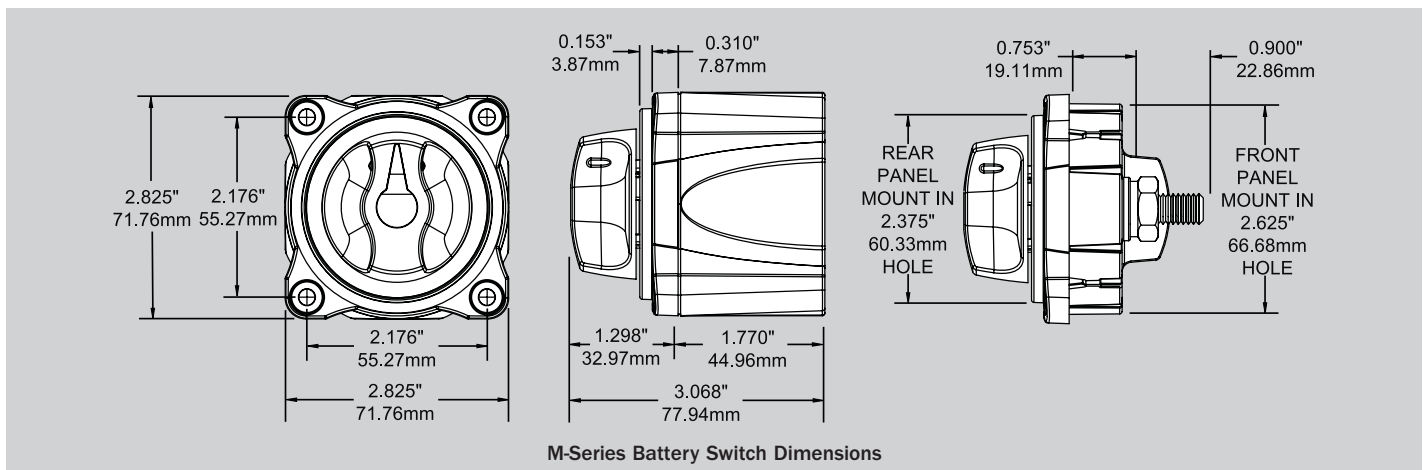
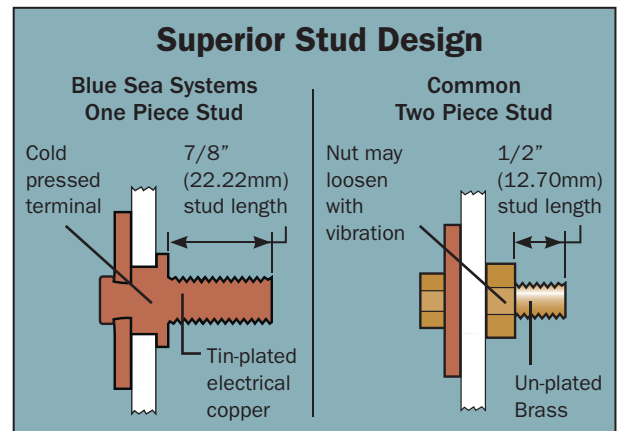
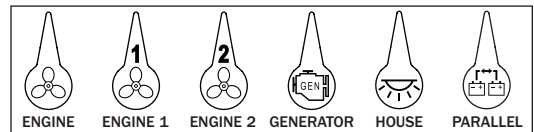
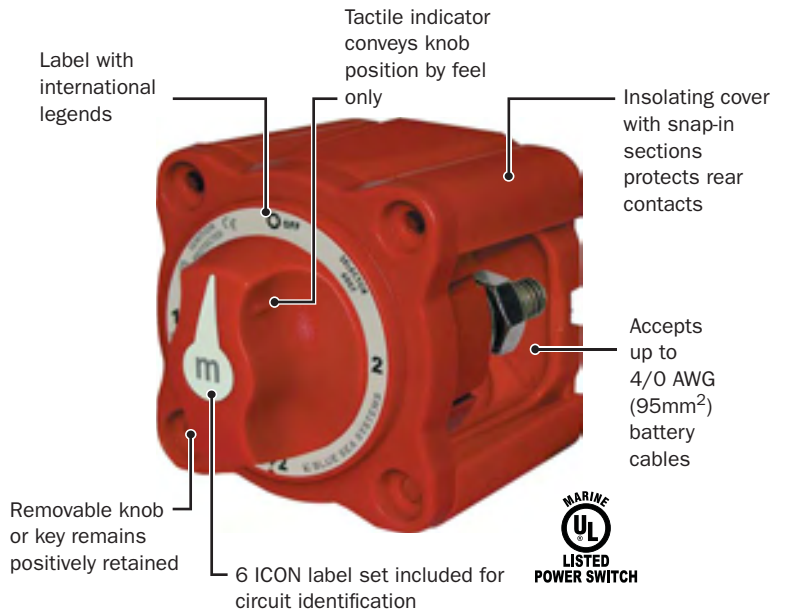
Agency Standards

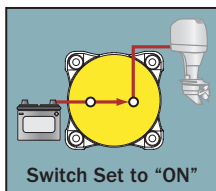
- Meets UL 1500 and SAE J1171 external ignition protection requirements

* Blue Sea Systems Engine Starting Standard (page 110)

** Per Circuit

*** Reducing cable size will reduce current rating





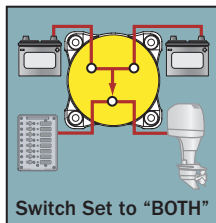
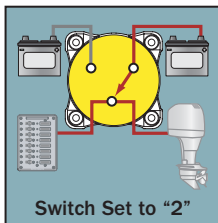
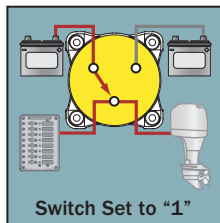
APPLICATIONS

1. Switches a single battery to a single load group.
2. Multiple switches can be used to manage several isolated circuits including cross connecting for emergency paralleling.

Note: 6005 replaces 9005 / 6006 replaces 9006

IP Single Circuit ON/OFF
6006

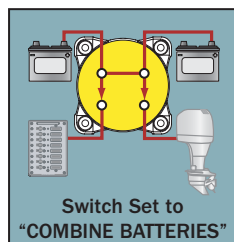
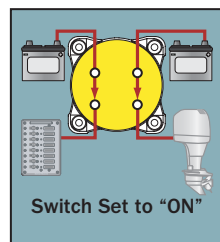
IP Single Circuit ON/OFF
6005



APPLICATION

1. Switches battery bank 1 or battery bank 2 or battery banks 1 and 2 to all loads using one switch.

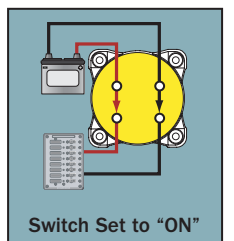
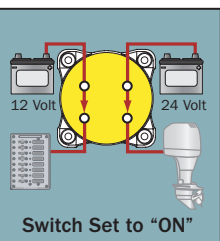
IP Selector 6007



APPLICATIONS

1. Switches two battery banks simultaneously with one simple ON/OFF switch while maintaining battery bank isolation, minimizing the risk of a dead Start battery.
2. The COMBINE BATTERIES function offers the ability to combine two battery banks in the event of a low battery.

IP Dual Circuit Plus™ 6011



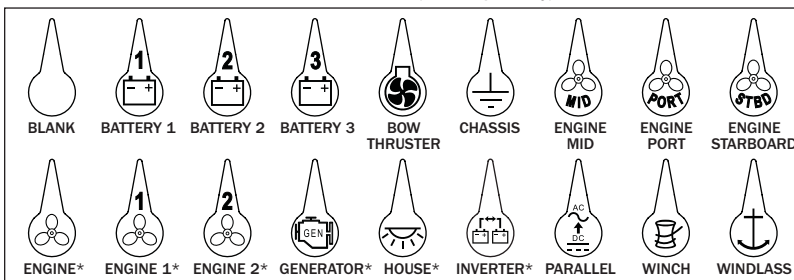
APPLICATIONS

1. Switches both positive and negative lines simultaneously with one simple ON/OFF switch meeting European and metal boat requirements for a double pole switch.
2. Switches circuits of different voltages, such as 12 Volt and 24 Volt, simultaneously with one simple ON/OFF switch.

IP Dual Circuit 6010

PN	Description	Weight Lb (Kg)
6005	SINGLE CIRCUIT ON/OFF Battery Switch	0.62 (0.28)
6006	SINGLE CIRCUIT ON/OFF Battery Switch	0.65 (0.29)
6007	SELECTOR Battery Switch	0.77 (0.35)
6010	DUAL CIRCUIT Battery Switch	0.80 (0.36)
6011	DUAL CIRCUIT PLUS™ Battery Switch	0.80 (0.36)
7901	Spare Knob for PN 6006	0.10 (0.05)
7900	Spare Key for PN 6005	0.10 (0.05)
7902	ICON Circuit Identification Label Kit	0.02 (0.01)
9159	m-Series Paralleling Link Bus	0.14 (0.06)

7902 ICON Circuit Identification Label Kit (Sold Separately)



* Included with battery switch

NEW PRODUCT

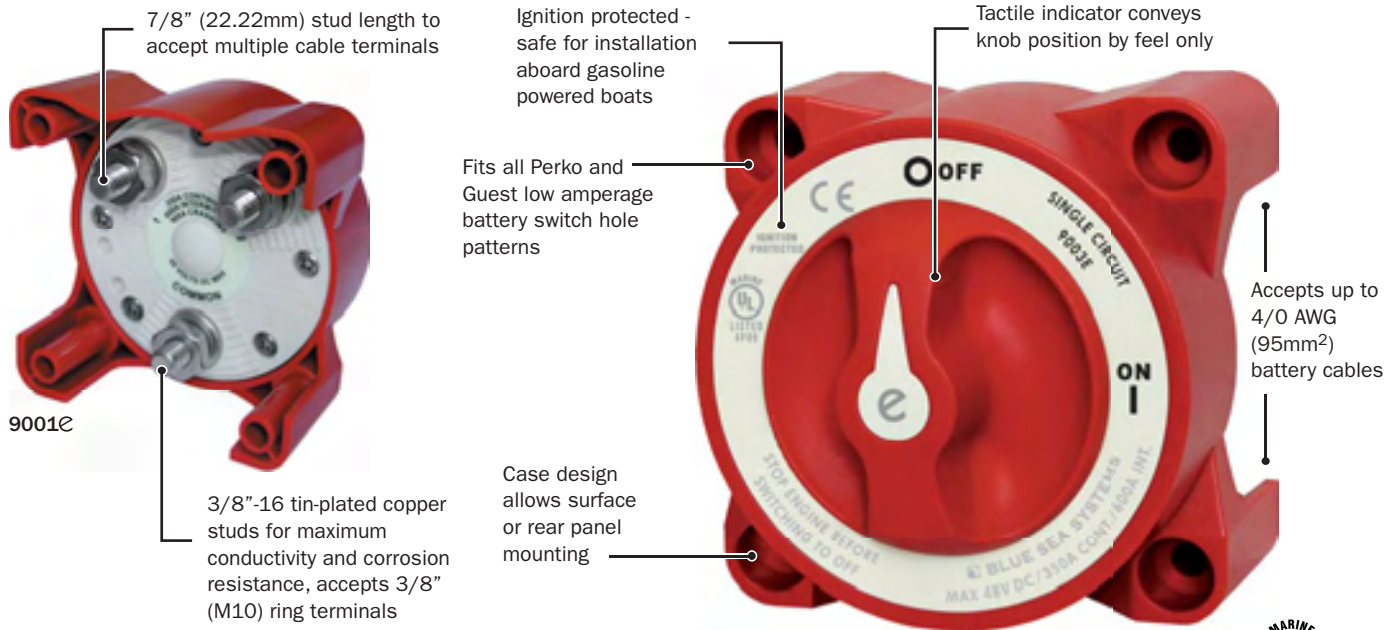
IP IGNITION PROTECTED

Specifications subject to change. See www.blueseas.com for current information.

e-Series Battery Switches

Rated the top standard-duty switch by Powerboat Reports*

Up to 350 Amperes Continuous Rating for small inboard gasoline or diesel engines



- AFD (Alternator Field Disconnect) feature on 9002e and 9004e models
- Meets American Boat and Yacht Council (ABYC) requirements for battery switches
- Make-before-break contact design on 9001e and 9002e models allows switching between battery banks without power interruption

* "Blue Sea Systems' switch (9001e) is our choice for best value in a standard-duty battery selector switch. It's made in the U.S. with high grade materials, comes with a lifetime warranty, and is the least expensive switch in our test." - Powerboat Reports , June 2005

Specifications

	9001e-9004e	5510e-5511e
Inrush Rating: .25 sec (10 repeats)*	1,750 Amperes DC	1,500 Amperes DC**
Cranking Rating: 9.75 sec (10 repeats)*	900 Amperes DC	700 Amperes DC**
Intermittent Rating: 5 min (UL 1107)	600 Amperes DC	525 Amperes DC**
Continuous Rating: (UL 1107)	350 Amperes DC	300 Amperes DC**
Maximum Voltage Rating	48 Volts DC	32 Volts DC
Terminal Stud Size	3/8"-16 (M10)	3/8"-16 (M10)
Terminal Stud Torque	140 in-lb (15.82 N·m)	140 in-lb (15.82 N·m)
Cable Size to Meet Ratings***	4/0 AWG (95mm ²)	4/0 AWG (95mm ²)
Cable Clearance For 4/0 Cables	1.10" (27.9mm)	1.10" (27.9mm)
Case Material	Reinforced Polycarbonate	Reinforced Polycarbonate

Certifications

- CE marked
- UL Listed - UL 1107 electric power switches

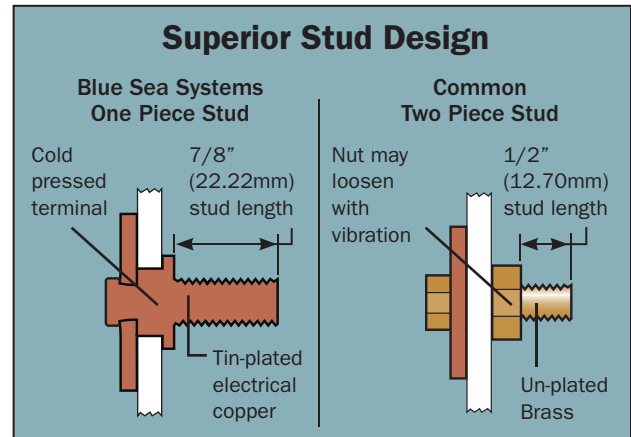
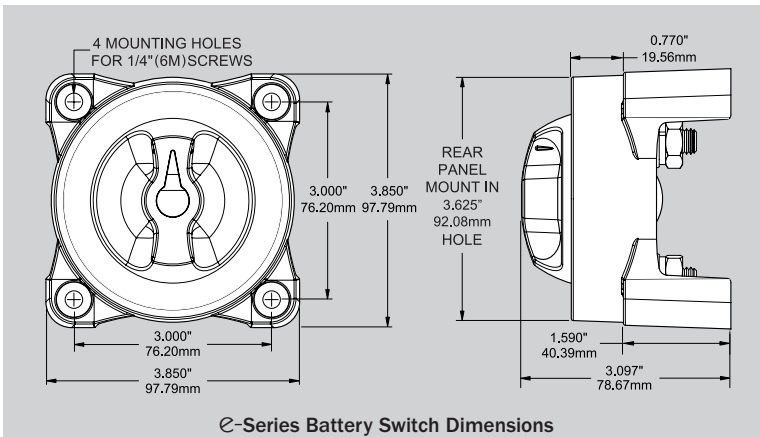
Agency Standards

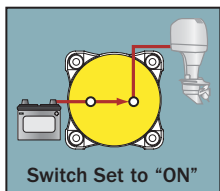
- Meets UL 1500 and SAE J1171 external ignition protection requirements

* Blue Sea Systems Engine Starting Standard (page 110)

** Per Circuit

*** Reducing cable sizes will reduce current ratings

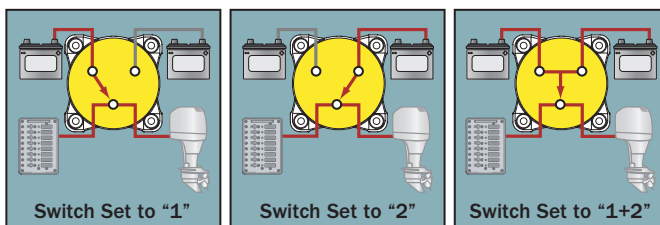




APPLICATIONS

1. Switches a single battery to a single load group.
2. Can be used in multiples to manage several isolated circuits including cross connecting for emergency paralleling.
9004C only - includes AFD*

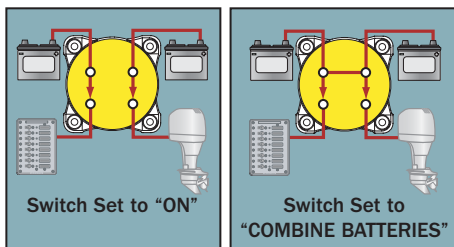
IP Single Circuit ON/OFF
9003C-9004C



APPLICATION

1. Switches battery bank 1 or battery bank 2 or battery banks 1 and 2 to all loads using one switch.
9002C only - includes AFD*

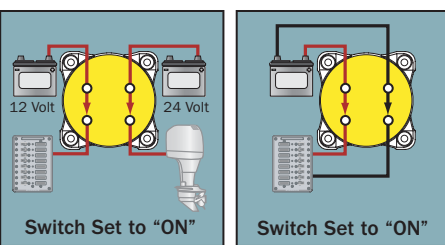
IP Selector 9001C-9002C



APPLICATIONS

1. Switches two battery banks simultaneously with one simple ON/OFF switch while maintaining battery bank isolation, minimizing the risk of a dead Start battery.
2. The COMBINE BATTERIES function offers the ability to combine two battery banks in the event of a low battery.

IP Dual Circuit Plus™ 5511C



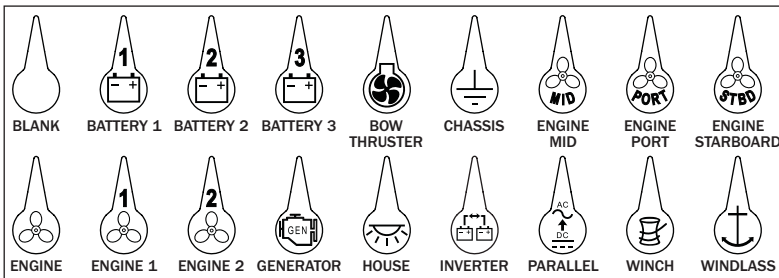
APPLICATIONS

1. Switches both positive and negative lines simultaneously with one simple ON/OFF switch meeting European and metal boat requirements for a double pole switch.
2. Switches circuits of different voltages, such as 12 Volt and 24 Volt, simultaneously with one simple ON/OFF switch.

IP Dual Circuit™ 5510C

7902 ICON Circuit Identification Label Kit (Sold Separately)

PN	Description	AFD*	Weight Lb (Kg)
9003C	SINGLE CIRCUIT ON/OFF Battery Switch	-	0.95 (0.43)
9004C	SINGLE CIRCUIT ON/OFF Battery Switch	Yes	0.95 (0.43)
9001C	SELECTOR Battery Switch	-	1.15 (0.52)
9002C	SELECTOR Battery Switch	Yes	1.15 (0.52)
5511C	DUAL CIRCUIT PLUS™ Battery Switch	-	1.16 (0.53)
5510C	DUAL CIRCUIT™ Battery Switch	-	1.16 (0.53)
7902	ICON Circuit Identification Label Kit	-	0.02 (0.01)



IP IGNITION PROTECTED

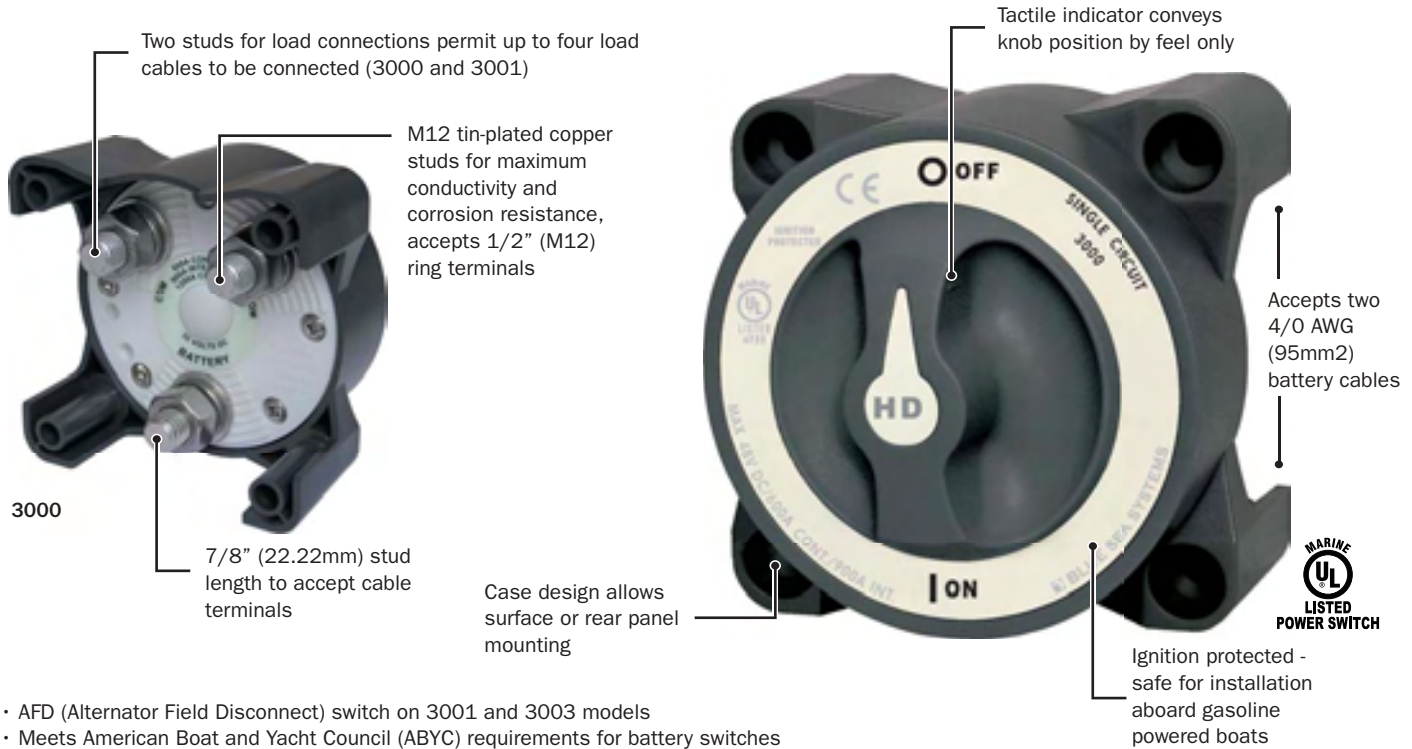
If the AFD is not used to protect the alternator, an LED can be connected to the AFD terminals to indicate when the battery switch is in any position but OFF:

- ON for the Single Circuit ON/OFF
- 1, 2, or 1+2 for the Selector

* Alternator Field Disconnect (AFD) protects the diodes in the alternator in the event of the switch being switched to the OFF position while the engine is running.

HD-Series Battery Switches (Heavy Duty)

Up to 600 Amperes Continuous Rating for large diesel engines



- AFD (Alternator Field Disconnect) switch on 3001 and 3003 models
- Meets American Boat and Yacht Council (ABYC) requirements for battery switches
- Make before break contact design on 3002 and 3003 models allows switching between battery banks without power interruption

Specifications

	3000-3001	3002-3003
Inrush Rating: .25 sec (10 repeats)*	2,000 Amperes DC	1,750 Amperes DC
Cranking Rating: 9.75 sec (10 repeats)*	1,200 Amperes DC	1,000 Amperes DC
Intermittent Rating: 5 min (UL 1107)	900 Amperes DC	700 Amperes DC
Continuous Rating: (UL 1107)	600 Amperes DC	500 Amperes DC
Maximum Voltage Rating	48 Volts DC	48 Volts DC
Terminal Stud Size	1/2" (M12)	1/2" (M12)
Terminal Stud Torque	220 in-lb (24.86 N·m)	220 in-lb (24.86 N·m)
Cable Size to Meet Ratings**	4/0 AWG (95mm ²)	4/0 AWG (95mm ²)
Cable Quantity to Meet Ratings**	Two Cables***	Two Cables/Terminal
Cable Clearance For 4/0 Cables	1.10" (27.9mm)	1.10" (27.9mm)
Case Material	Reinforced Polycarbonate	Reinforced Polycarbonate

Certifications

- CE marked
- UL Listed - UL 1107 electric power switches

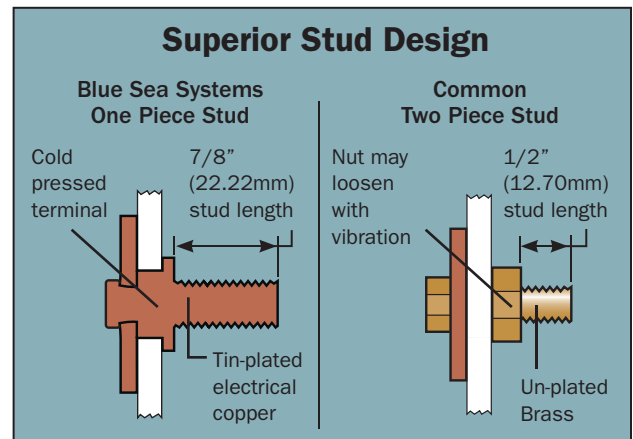
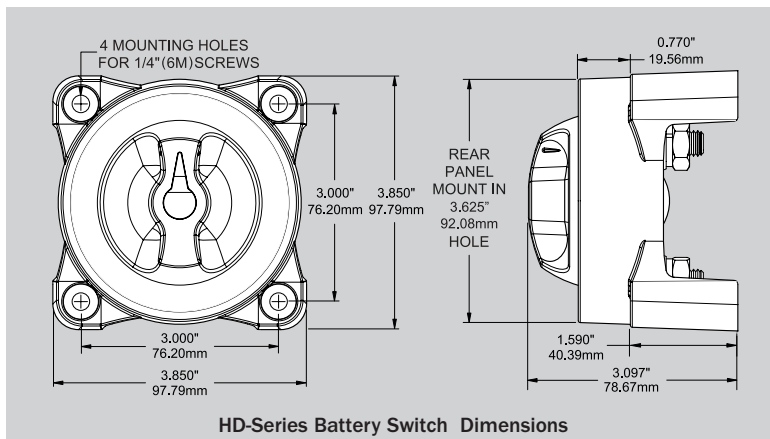
Agency Standards

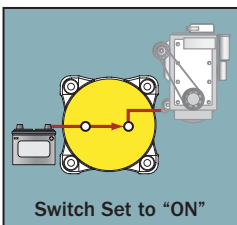
- Meets UL 1500 and SAE J1171 external ignition protection requirements

* Blue Sea Systems Engine Starting Standard (page 110)

** Reducing cable sizes or quantities will reduce current ratings

*** Two cables on battery terminal, one cable on each common terminal

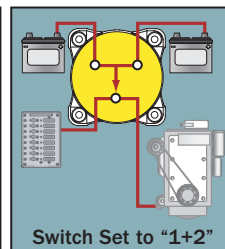
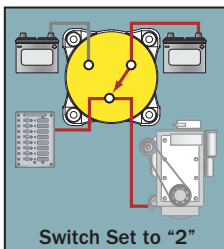
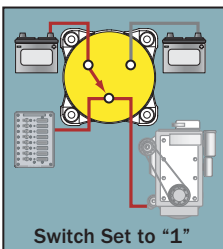




APPLICATIONS

1. Switches a single battery to a single load group.
 2. Multiple switches can be used to manage several isolated circuits including cross connecting for emergency paralleling.
- 3001 only - includes AFD*

IP Single Circuit ON/OFF
3000-3001



APPLICATION

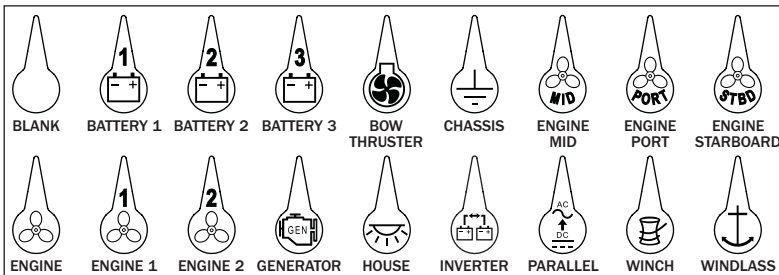
1. Switches battery bank 1 or battery bank 2 or battery banks 1 and 2 to all loads using one switch.
- 3003 only - includes AFD*

IP Selector 3002-3003

PN	Description	AFD*	Weight Lb (Kg)
3000	SINGLE CIRCUIT ON/OFF Battery Switch	-	1.30 (0.59)
3001	SINGLE CIRCUIT ON/OFF Battery Switch	Yes	1.30 (0.59)
3002	SELECTOR Battery Switch	-	1.25 (0.57)
3003	SELECTOR Battery Switch	Yes	1.25 (0.57)
7902	ICON Circuit Identification Label Kit	-	0.02 (0.01)

IP IGNITION PROTECTED

7902 ICON Circuit Identification Label Kit (Sold Separately)



If the AFD is not used to protect the alternator, an LED can be connected to the AFD terminals to indicate when the battery switch is in any position but OFF:

- ON for the Single Circuit ON/OFF
- 1, 2, or 1+2 for the Selector

* Alternator Field Disconnect (AFD) protects the diodes in the alternator in the event of the switch being switched to the OFF position while the engine is running.



Parallel Circuit Mini Battery Switch Panels

Enables a failed House or Start battery bank to be isolated from the electrical system and both House and Start loads to be operated from the remaining battery bank.

- Isolates Engine circuit from House circuit
- Protects electronics from sags and spikes caused by engine cranking
- Allows independent battery discharge
- Addition of an Automatic Charging Relay automates charging both batteries (pages 18-21)
- Ignition protected - safe for installation aboard gasoline powered boats

Specifications

Inrush Rating: .25 sec (10 repeats)*	1,500 Amperes DC
Cranking Rating: 9.75 sec (10 repeats)*	700 Amperes DC
Intermittent Rating: 5 min (UL 1107)	500 Amperes DC
Continuous Rating: (UL 1107)	300 Amperes DC
Maximum Voltage Rating	48 Volts DC
Terminal Stud Size	3/8"-16 (M10)
Terminal Stud Torque	140 in-lb (15.82 N·m)
Cable Size to Meet Ratings**	4/0 AWG (95mm ²)
Cable Clearance For 4/0 Cables	1.12" (28.4mm)

Certifications

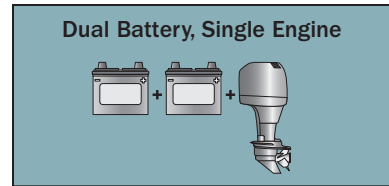
- Battery switches are CE marked
- Battery switches are UL Listed - UL 1107 electric power switches

Agency Standards

- Meets SAE J1171 external ignition protection requirements
- * Blue Sea Systems Engine Starting Standard (page 110)
- ** Reducing cable sizes will reduce current ratings

Panel PN	Installed Battery Switch PN	Battery Switch on Pages	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)
8280	M-Series SINGLE CIRCUIT ON/OFF 3 of 6006	6-7	6.25 (158.75)	7.50 (190.50)	3.20 (1.45)
8370	M-Series SINGLE CIRCUIT ON/OFF 3 of 6006	6-7	9.50 (241.30)	4.38 (111.25)	3.10 (1.41)

IP IGNITION PROTECTED

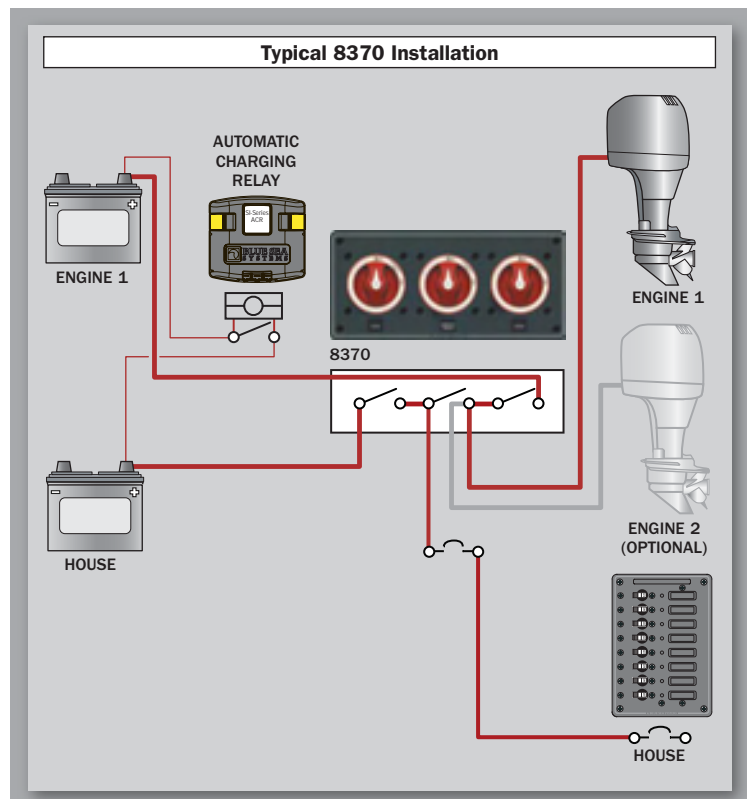
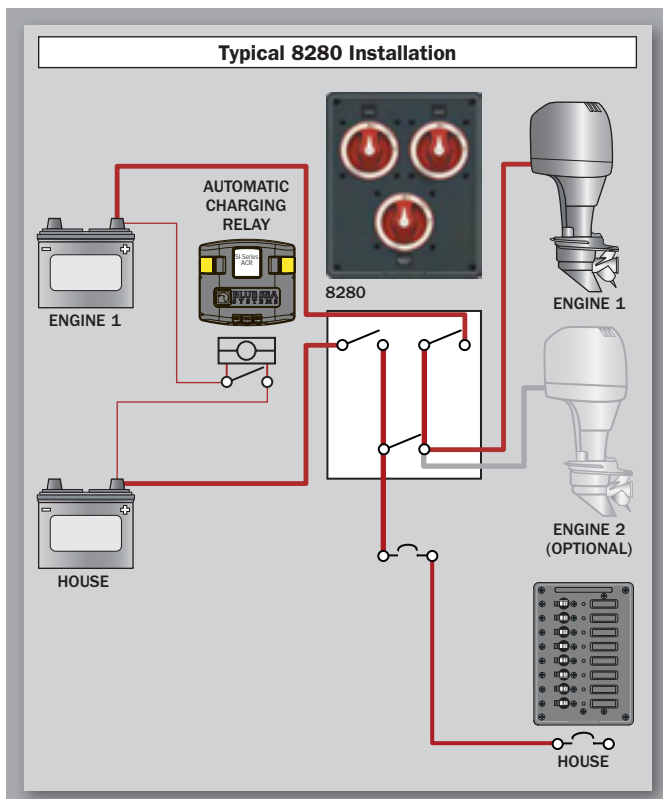


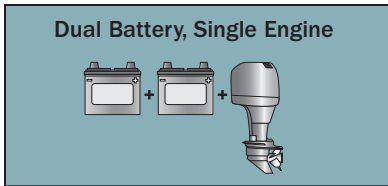
IP 8280



IP 8370

Combine with Blue Sea Systems' Automatic Charging Relays (pages 18-21) for a complete DC management solution.





IP 8080

Combine with Blue Sea Systems' Automatic Charging Relays (pages 18-21) for a complete DC management solution.

Parallel Circuit Mini Battery Switch Plus Main Panel

Isolates batteries and provides DC main circuit protection.

- Isolates the Engine circuit from the House circuit
- Protects electronics from sags and spikes caused by engine cranking
- Allows independent battery discharge
- Addition of an Automatic Charging Relay automates charging of both batteries (pages 18-21)
- Ignition protected - safe for installation aboard gasoline powered boats
- Enables a failed Start battery to be isolated from the electrical system and both House and Start loads to be operated from the remaining battery bank
- Provides main circuit protection for DC House power system

Specifications

Inrush Rating: .25 sec (10 repeats)*	1,500 Amperes DC
Cranking Rating: 9.75 sec (10 repeats)*	700 Amperes DC
Intermittent Rating: 5 min (UL 1107)	500 Amperes DC
Continuous Rating: (UL 1107)	300 Amperes DC
Maximum Voltage Rating	48 Volts DC
House Circuit Protection	100 Amperes DC
Terminal Stud Size	3/8"-16 (M10)
Terminal Stud Torque	140 in-lb (15.82 N·m)
Cable Size to Meet Ratings**	4/0 AWG (95mm ²)
Cable Clearance For 4/0 Cables	1.12" (28.4mm)

Certification

- All components are CE marked

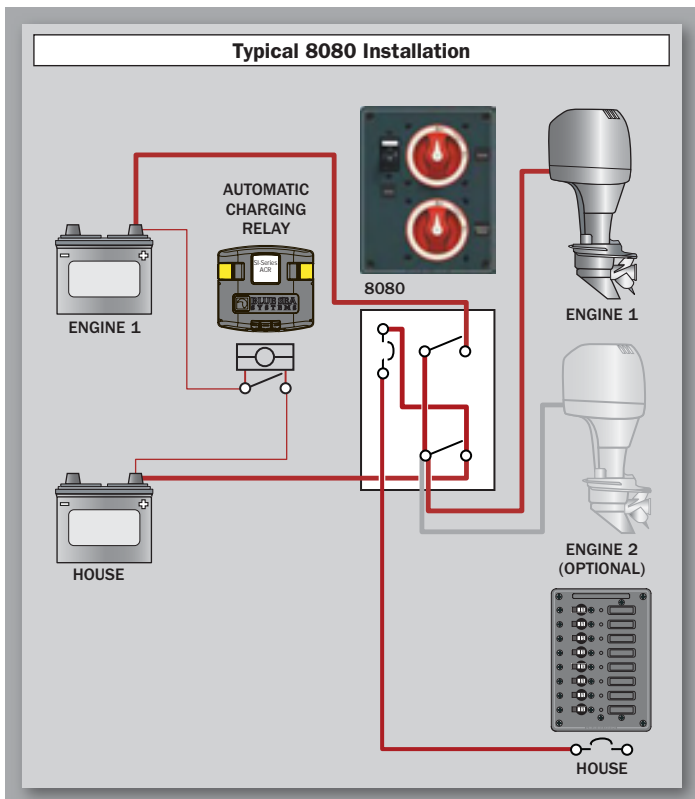
Agency Standards

- Meets SAE J1171 external ignition protection requirements

* Blue Sea Systems Engine Starting Standard (page 110)

Panel PN	Installed Battery Switch PN	Battery Switch on Pages	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed C-Series Flat Rocker Circuit Breaker
						100A
8080	M-Series SINGLE CIRCUIT ON/OFF 2 of 6006	6-7	5.25 (133.35)	6.50 (165.10)	2.20 (1.00)	1

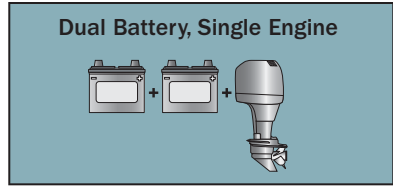
IP IGNITION PROTECTED



Dual Battery Main Distribution Panels

Common Features

- Available in four configurations
- Provides 24 hour circuit protection
- Provides main DC circuit protection in addition to high ampere load protection
- Designed for single engine configurations
- Addition of an Automatic Charging Relay automates charging both batteries (pages 18-21)
- Includes 4218 - Square Format Labels and 4140 - 24 Hour Round Labels (page 82)



8686



8691

8686/8690 Features

- Allows emergency cross connect between isolated battery banks
- Isolates the Engine circuit from the House circuit reducing the chance of fully discharging both batteries
- Protects electronics from sags and spikes caused by engine cranking
- Simplifies battery switch operation
- Allows independent battery discharge

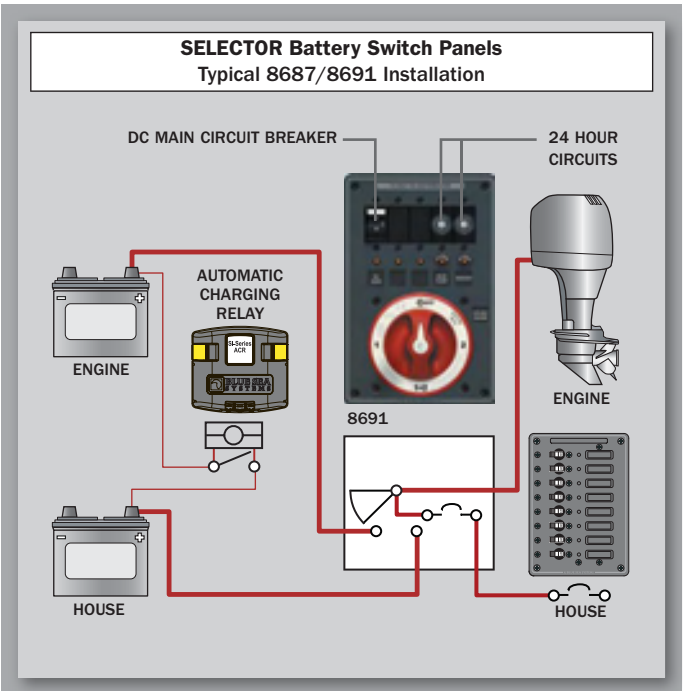
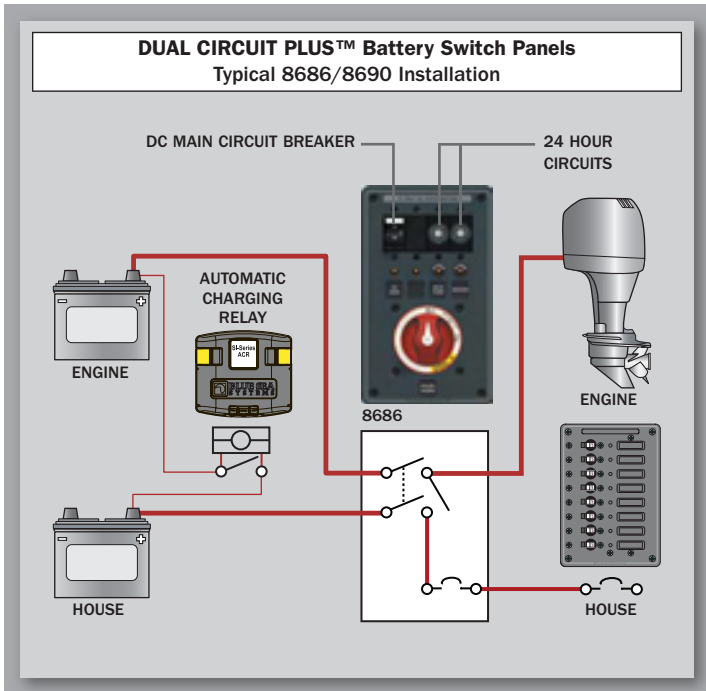
Specifications

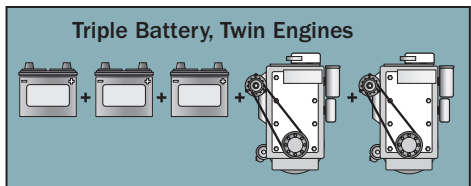
	8686	8687	8690	8691
Inrush Rating: .25 sec. (10 repeats)*	1,200 Amperes DC**	1,500 Amperes DC	1,500 Amperes DC**	1,750 Amperes DC
Cranking Rating: 9.75 sec. (10 repeats)*	600 Amperes DC**	700 Amperes DC	700 Amperes DC**	900 Amperes DC
Intermittent Rating: 5 min. (UL 1107)	450 Amperes DC**	500 Amperes DC	525 Amperes DC**	600 Amperes DC
Continuous Rating: (UL 1107)	300 Amperes DC**	300 Amperes DC	300 Amperes DC**	350 Amperes DC
Nominal Voltage	12/24 Volts DC	12/24 Volts DC	12/24 Volts DC	12/24 Volts DC
House Circuit Protection	100 Amperes DC	100 Amperes DC	100 Amperes DC	100 Amperes DC
Weight	1.85Lb (0.84Kg)	1.80Lb (0.82Kg)	2.64Lb (1.20Kg)	2.60Lb (1.18Kg)

Certification

- All components are **CE** marked
- * Blue Sea Systems Engine Starting Standard (page 110)
- ** Per Circuit

Panel PN	Installed Battery Switch PN	Switch Pages	Width in" (mm)	Height in" (mm)	Installed C-Series Flat Rocker Circuit Breaker	Installed Push Button Thermal Circuit Breakers
					100A	15A
8686	M-Series, DUAL CIRCUIT PLUS™ 6011	6-7	4.50 (114.30)	7.50 (190.50)	1	2
8687	M-Series, SELECTOR 6007	6-7	4.50 (114.30)	7.50 (190.50)	1	2
8690	E-Series, DUAL CIRCUIT PLUS™ 5511E	8-9	5.25 (133.35)	8.00 (203.20)	1	2
8691	E-Series, SELECTOR 9001E	8-9	5.25 (133.35)	8.00 (203.20)	1	2





8689



8693

Triple Battery Main Distribution Panels

- Available in two configurations
- Provides 24 hour circuit protection
- Isolates the Engine circuit from the House circuit reducing the chance of fully discharging both batteries
- Simplifies battery switch operation
- Protects electronics from sags and spikes caused by engine cranking
- Allows independent battery discharge
- Addition of Automatic Charging Relays automates charging of all batteries (pages 18-21)
- Designed for twin engine configurations
- Allows emergency cross connect between isolated battery banks
- Provides main DC circuit protection in addition to high ampere load protection
- Includes 4218 - Square Format Labels and 4140 - 24 Hour Round Labels (page 82)

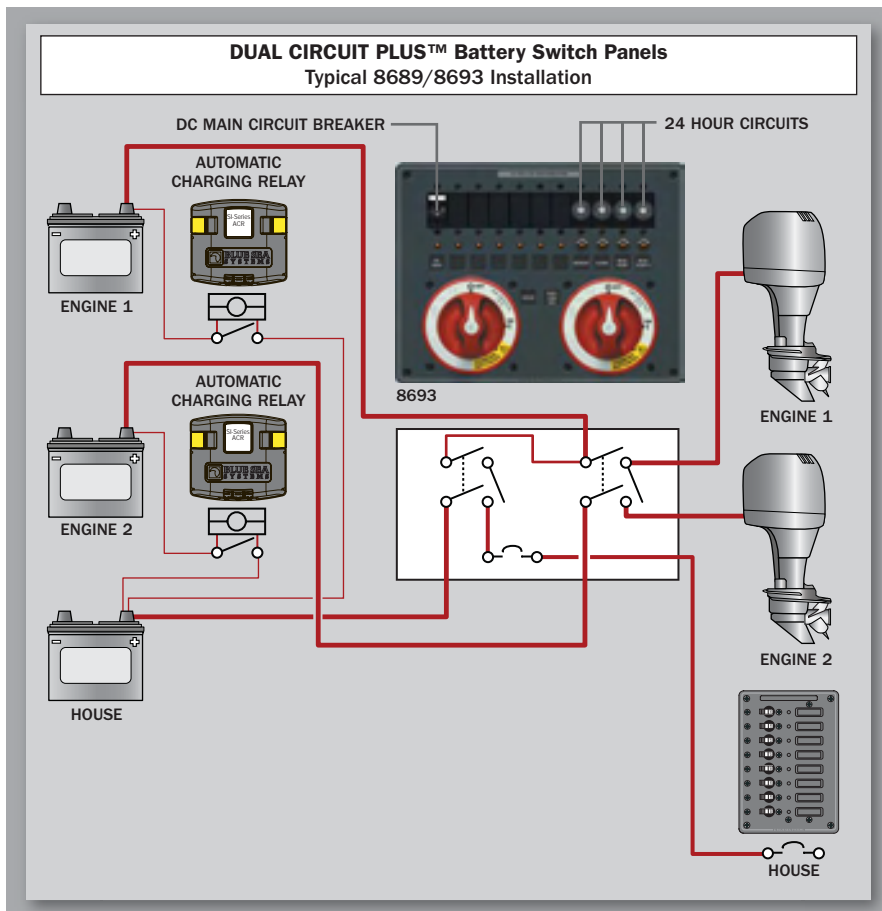
Specifications

	8689	8693
Inrush Rating: .25 sec. (10 repeats)*	1,200 Amperes DC**	1,500 Amperes DC**
Cranking Rating: 9.75 sec. (10 repeats)*	600 Amperes DC**	700 Amperes DC**
Intermittent Rating: 5 min. (UL 1107)	450 Amperes DC**	525 Amperes DC**
Continuous Rating: (UL 1107)	300 Amperes DC**	300 Amperes DC**
Nominal Voltage	12/24 Volts DC	12/24 Volts DC
House Circuit Protection	100 Amperes DC	100 Amperes DC
Weight	3.46Lb (1.57Kg)	4.42Lb (2.00Kg)

Certification

- All components are **CE** marked
- * Blue Sea Systems Engine Starting Standard (page 110)
- ** Per Circuit

Panel PN	Installed Battery Switch PN's	Switch Pages	Width in" (mm)	Height in" (mm)	Installed C-Series Flat Rocker Circuit Breaker	Installed Push Button Thermal Circuit Breakers
					100A	15A
8689	M-Series, DUAL CIRCUIT PLUS™ 2 of 6011	6-7	7.25 (184.15)	8.00 (203.20)	1	3
8693	C-Series DUAL CIRCUIT PLUS™ 2 of 5511C	8-9	10.50 (266.70)	8.00 (203.20)	1	4



L-Series Solenoid Switches

450 Ampere Class, Designed for 12 and 24 Volt Systems

- Hermetically sealed contacts/vaporproof
- Ignition protected - safe for installation aboard gasoline powered boats
- Can function as a remote battery switch
- Activated by an ON-OFF switch mounted anywhere
- Noise free circuitry will not interfere with other devices

Specifications	5301 - 12 Volt	5302 - 24 Volt
Main Power Contacts		
Inrush Rating; 2.5 sec.	2,000 Amperes	2,000 Amperes
Maximum Voltage Rating	60 Volts DC	60 Volts DC
Terminal Stud Size	M8 (5/16")	M8 (5/16")
Terminal Stud Torque	80-100 in-lb	80-100 in-lb
Contact Form	SPST-NO	SPST-NO
Mechanical Life	1,000,000 Cycles	1,000,000 Cycles
Coil Circuit		
Input Voltage	9.6-13.2 Volts	19.2-26.9 Volts
Power Consumption		
– Holding	1.0 Ampere	0.59 Ampere

Certification

- CE marked

Agency Standards

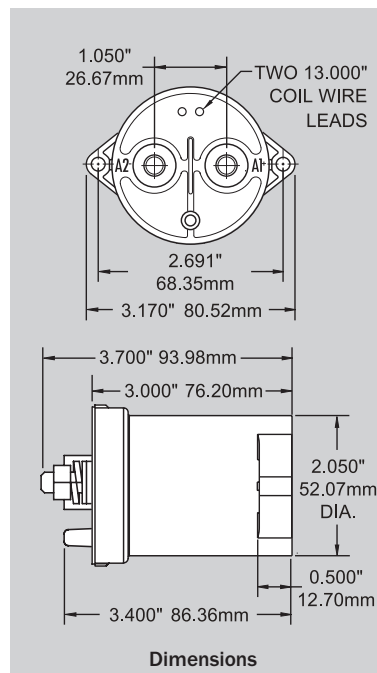
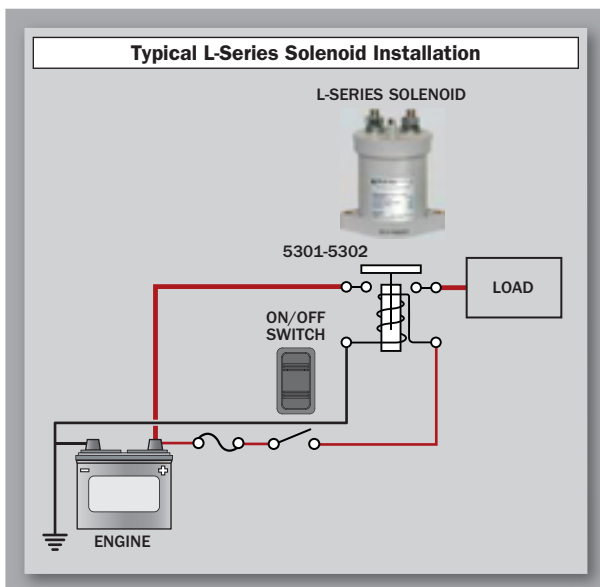
- Meets SAE J1171 external ignition protection requirements

Wire Size	Cranking Rating 9.75 sec. (10 repeats)*	Intermittent Rating 5 min. (UL 1107)	Continuous Rating (UL 1107)
1/0	500A	275A	250A
2/0	500A	400A	300A
2x2/0	800A	600A	450A

* Blue Sea Systems Engine Starting Standard (page 110)

PN	Description	Voltage	Weight Lb (Kg)
5301	Solenoid Switch	12V	1.40 (0.64)
5302	Solenoid Switch	24V	1.40 (0.64)

IP IGNITION PROTECTED



IP 5301-5302



Blue Sea Systems' ON-OFF switches

- Provides ON-OFF switching

▶ See pages 76, 77, and 78

L-Series Solenoid Switch with Coil Economizer

450 Ampere Class, Designed for 12 or 24 Volt Systems

- Hermetically sealed contacts/vaporproof
- Ignition protected - safe for installation aboard gasoline powered boats
- Can function as a remote battery switch
- Activated by an ON-OFF switch mounted anywhere
- Integrated coil control minimizes heating and amperage draw



IP 9012

Specifications

9012 - 12/24 Volt

Main Power Contacts

Inrush Rating: 2.5 sec.	2,000 Amperes
Maximum Voltage Rating	60 Volts DC
Terminal Stud Size	M8 (5/16")
Terminal Stud Torque	80-100 in-lb
Contact Form	SPST-NO
Mechanical Life	1,000,000 Cycles

Coil Circuit

Input Voltage	9-36 Volts
Power Consumption	
– Inrush max, 130ms	3.80 Amperes
– Holding	12 Volts-0.13 Amperes
	24 Volts-0.07 Amperes

Certification

- CE marked

Agency Standards

- UL Recognized - UL 508 industrial control equipment
- Meets SAE J1171 external ignition protection requirements



8230

4150

8204

Blue Sea Systems' ON-OFF switches

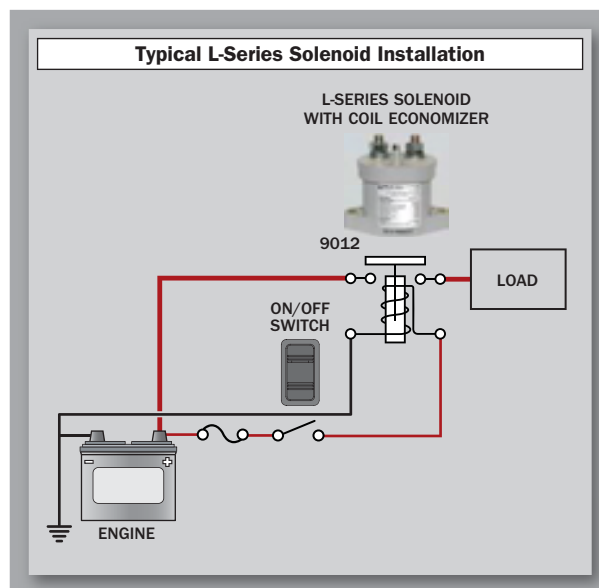
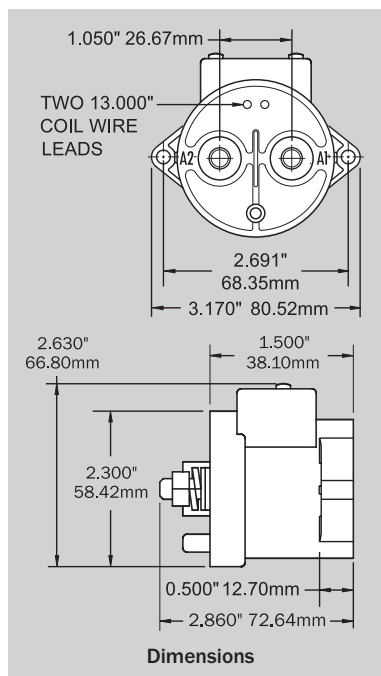
- Provides ON-OFF switching
- ▶ See pages 76, 77, and 78

Wire Size	Cranking Rating 9.75 sec. (10 repeats)*	Intermittent Rating 5 min. (UL 1107)	Continuous Rating (UL 1107)
1/0	500A	275A	250A
2/0	500A	400A	300A
2x2/0	800A	600A	450A

* Blue Sea Systems Engine Starting Standard (page 110)

PN	Description	Voltage	Weight Lb (Kg)
9012	Solenoid Switch with Coil Economizer	12/24	1.00 (0.45)

IP IGNITION PROTECTED



CL-Series BatteryLink™ Automatic Charging Relay (Current Limiting) with Over Current Protection

- Automatically combines battery banks during the charging cycle and isolates under discharge
- Limits current flow allowing smaller wire size
- Activates from any charging source - alternators, battery chargers, or solar panels
- Senses charge voltages on up to two battery banks
- Ignition protected - safe for installation aboard gasoline powered boats
- Noise free circuitry will not interfere with other devices
- Low current draw when closed: <0.2A

Specifications

Main Power Contacts

Continuous Rating	60 Amperes DC
7 Minute Rating	90 Amperes DC
2 Minute Rating	120 Amperes DC
Voltage Rating	16 Volts DC for 12 Volts DC Nominal Systems
Current Limiting	60A at 25°C ambient
Stud Terminal Size	3/8" (M10)
Contact Form	SPST-NO
Mechanical Life	1,000,000 Cycles

Coil Circuit

Input Voltage 9-16 Volts DC Maximum

Automatic Operation

Automatically combines when the higher battery has remained at the required voltage for at least 30 seconds. The CL-Series BatteryLink™ ACR disconnects when the voltage drops below the charging voltage to prevent accidental discharge of an unintended bank.

Certification

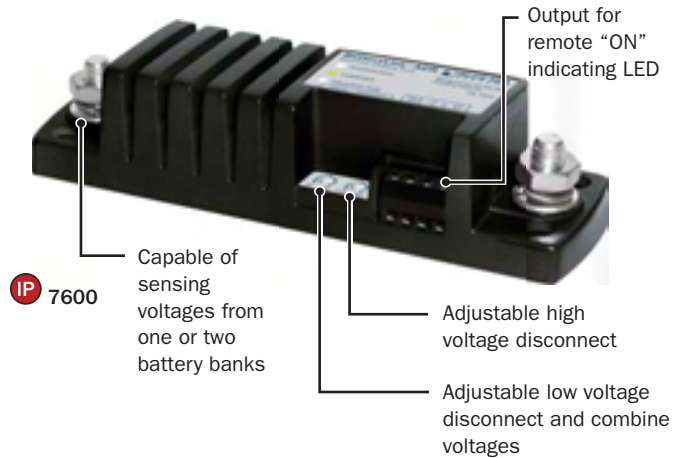
- CE marked

Agency Standards

- Meets SAE J1171 external ignition protection requirements

PN	Description	Weight Lb (Kg)
7600	CL-Series BatteryLink™ ACR	0.85 (0.39)
8270	Switch Panel	0.27 (0.12)

IP IGNITION PROTECTED



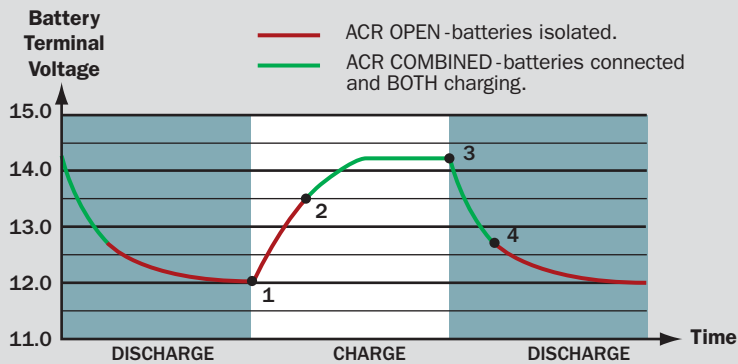
The BatteryLink™ ACR may also be used as a DC Low Voltage Disconnect (DC Load Manager) and as a means for charging a battery installed at a distance from a main battery bank (Battery Link). For these uses, please see the Application Brief section of our website at www.bluesea.com.



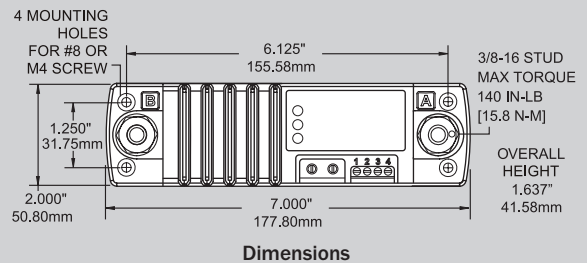
8270 (Optional)

- Provides manual operation - when connected, the CL-Series BatteryLink™ ACR can be turned off, set to automatic, or manually combined.

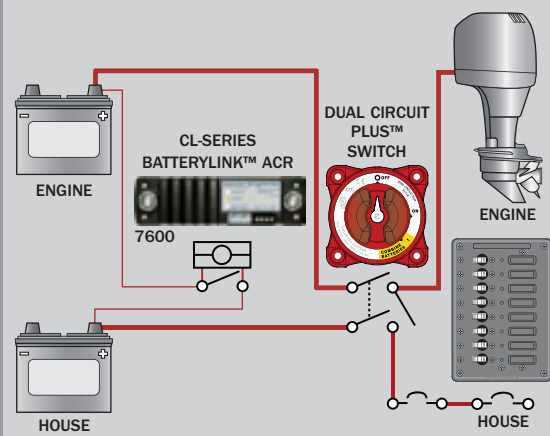
CL-Series BatteryLink™ ACR Operation



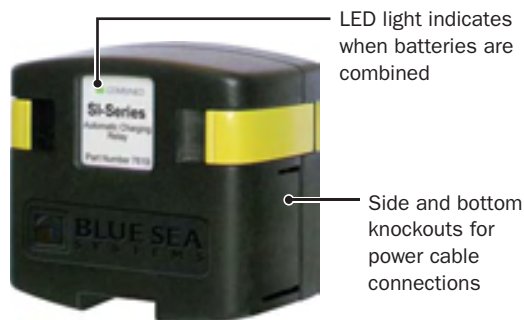
1. ACR relay is open and batteries are isolated. Voltage begins to rise slowly after engine starts or battery charger is turned on.
2. When voltage rises to "COMBINE" voltage set on ACR (13.5 volts in this example), ACR relay closes, connecting and charging both batteries.
3. When engine stops or battery charger is turned off, voltage rapidly begins falling.
4. When voltage falls to 6% less than "COMBINE" voltage (13.5 volts 6% = 12.7 volts in this example), ACR relay opens isolating batteries after 30 seconds.



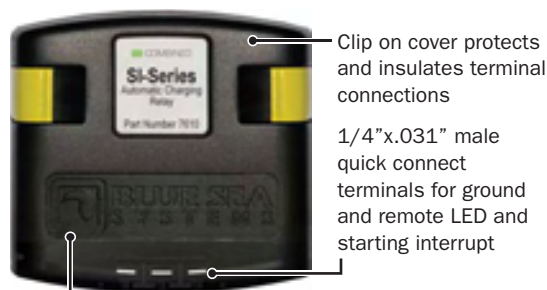
Typical CL-Series BatteryLink™ ACR Installation



See www.bluesea.com for a complete wiring diagram



IP 7610



Cover On



Cover Off

- Label recess to identify terminal connections
- 3/8"-16 tin-plated copper studs for maximum conductivity and corrosion resistance, accepts 3/8" (M10) ring terminals
- 7/8" (22.22mm) stud length to accept multiple cable terminals
- Accepts up to 4/0 AWG (95mm²) battery cables

SI-Series Automatic Charging Relay (Starting Isolation) NEW PRODUCT
Designed for 12 or 24 Volt Systems

Available in the Winter of 2006

- Allows temporary isolation of house loads from engine circuit during engine cranking to protect sensitive electronics
- Automatically combines battery banks during the charging cycle and isolates under discharge
- 12/24 Volt auto ranging voltage input
- Hermetically sealed contacts/vaporproof
- Waterproof rated IP67 - temporary immersion for 30 minutes
- Ignition protected - safe for installation aboard gasoline powered boats
- Remote LED output indicates relay state away from ACR
- Supports high-output alternators up to 120 Amperes

Specifications

	12 Volt	24 Volt
Continuous Rating	120 Amperes DC	120 Amperes DC
Intermittent 2 Minute Rating	210 Amperes DC	210 Amperes DC
Inrush 5 Second Current Rating	280 Amperes DC	280 Amperes DC
Switching Rating	240 Amperes DC	120 Amperes DC
Closing Voltage	13.5 Volts DC	27.0 Volts DC
Opening Voltage	12.7 Volts DC	25.4 Volts DC
Opening Delay	0.34 sec.	0.34 sec.
Maximum Torque	140 in-lbs	140 in-lbs
Relay Contact Position		
- Combine	13.6 Volts DC	27.2 Volts DC
- Open Low	12.6 Volts DC	25.2 Volts DC
- Open High	15.0 Volts DC	30.0 Volts DC

Certification

- CE marked

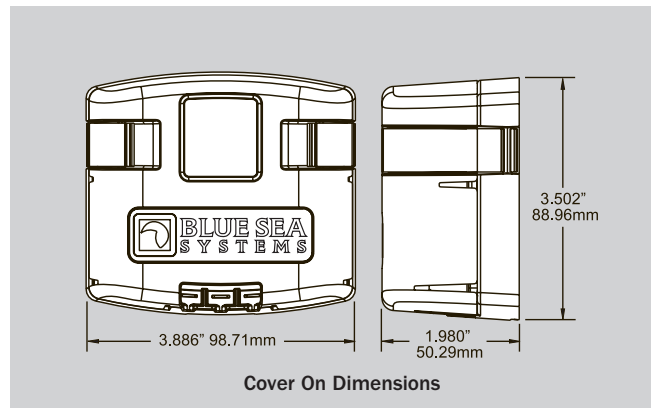
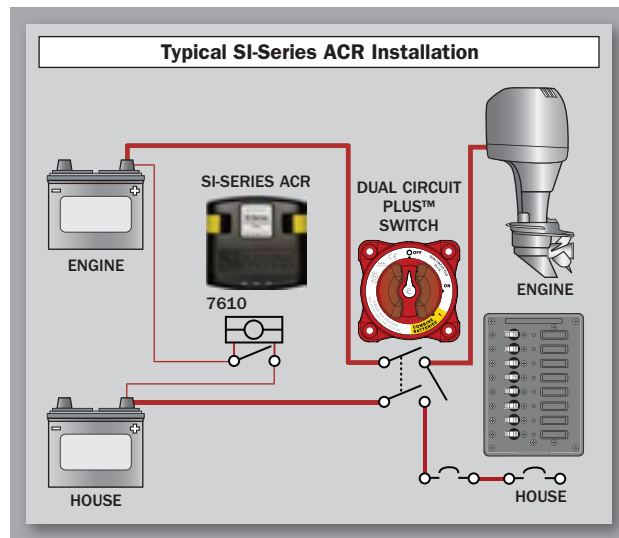
Agency Standards

- ISO 8846
- Meets SAE J1171 external ignition protection requirements

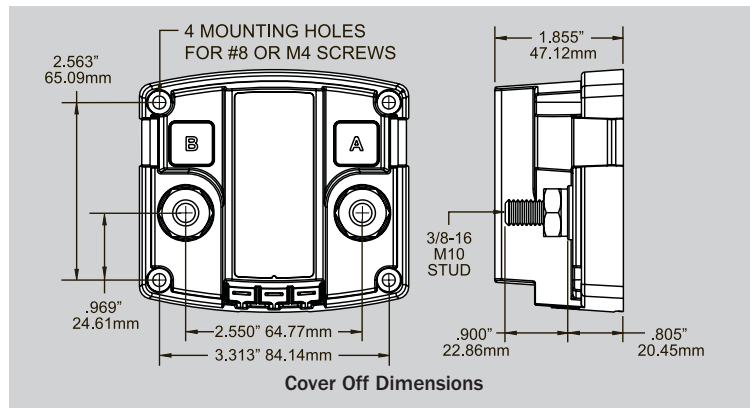
PN	Description
7610	12/24 Volt SI-Series ACR

NEW PRODUCT

IP IGNITION PROTECTED



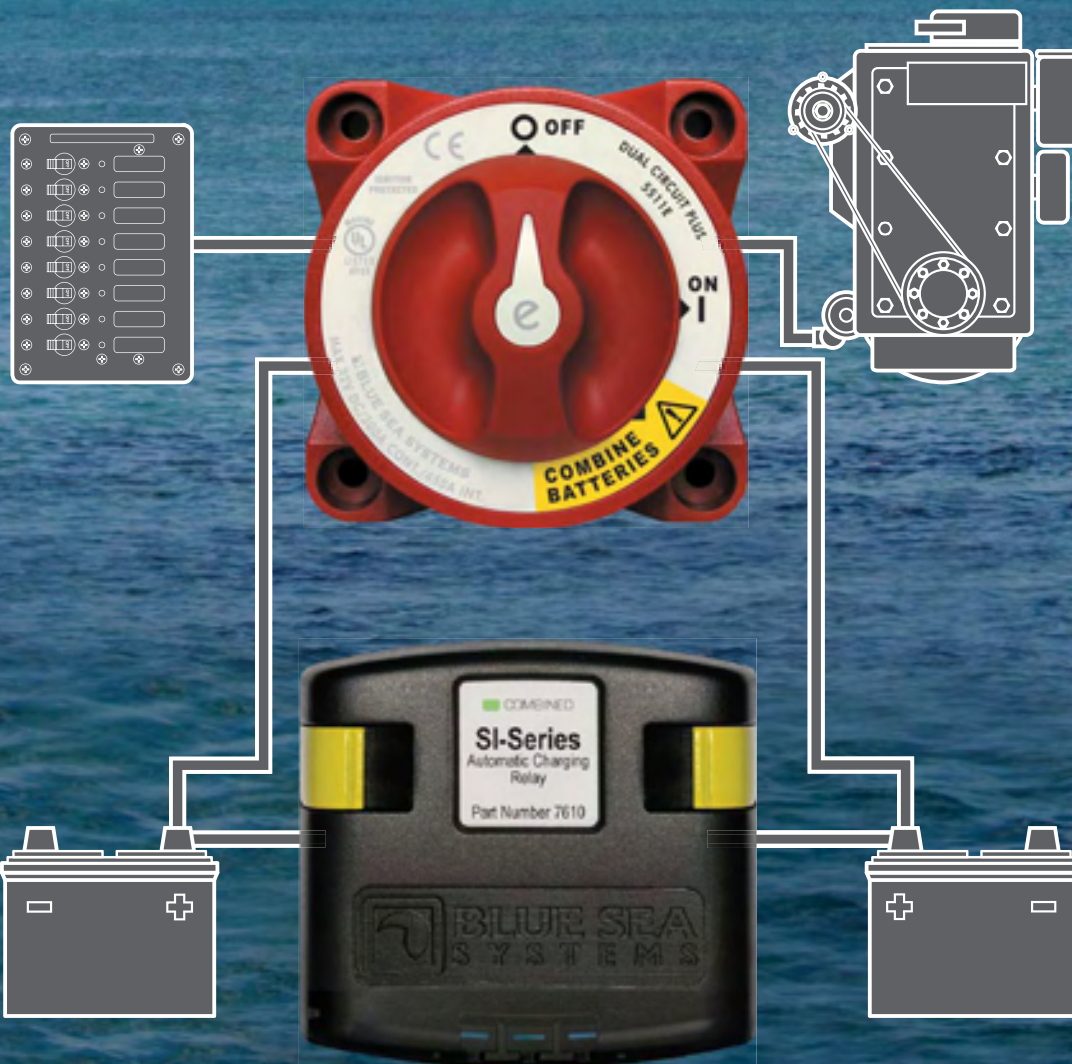
Cover On Dimensions



Cover Off Dimensions

new *Dual Circuit System*

Simplifies Switching • Automates Charging



The Dual Circuit System consists of the 5511e, e-Series Dual Circuit Plus™ Battery Switch and the 7610, SI-Series Automatic Charging Relay (in one package).

- The Dual Circuit Plus™ Battery Switch isolates engine and house circuits, and combines batteries for emergency starting
- The SI-Series Automatic Charging Relay combines batteries for charging

PN	Description
7650	Dual Circuit System - includes 7610 and 5511e

NEW PRODUCT

Available in the Winter of 2006

- ▶ See pages 8-9 for detailed information about the 5511e, e-Series Dual Circuit Plus™ Battery Switch
- ▶ See page 19 for detailed information about the 7610, SI-Series Automatic Charging Relay



IP 9112

L-Series ACR with Coil Economizer

450 Ampere Class, Designed for 12 or 24 Volt Systems

- Automatically combines battery banks during the charging cycle and isolates under discharge
- Override for emergency engine paralleling to start an engine
- Activates whether the charging source is an alternator or battery charger
- Output for "ON" indicating LED
- Integrated coil control minimizes heating and amperage draw
- Hermetically sealed contacts
- Ignition protected - safe for installation aboard gasoline powered boats
- Single or double sensing
- Pulse circuit requires very low current draw when contact is closed

Specifications

Coil Circuit

Input Voltage	9-36 Volts DC
Power Consumption	
- inrush max, 130ms	12-36 Volts DC/3.80 Amperes DC
- holding	12 Volts DC/0.13 Amperes DC, 24 Volts DC/0.07 Amperes DC

Main Power Contacts

Inrush Rating: 0.25 sec. (10 repeats)*	2,000 Amperes DC
Voltage Rating	60 Volts DC
Stud Terminal Size	M8 (accepts 5/16" ring terminals)
Contact Form	SPST-NO
Mechanical Life	1,000,000 Cycles
Relay Contact Position	
- Combine	12 Volts DC/13.6 Volts DC, 24 Volts DC/27.2 Volts DC
- Open Low	12 Volts DC/12.6 Volts DC, 24 Volts DC/25.2 Volts DC
- Open High	12 Volts DC/15.0 Volts DC, 24 Volts DC/30.0 Volts DC



(Optional)

8232

- Provides manual operation - When connected, the ACR can be turned off, set to automatic, or manually closed.

▶ See page 71 for full selection of Water Resistant Contura Switches



(Optional)

8270

- Provides manual operation - When connected, the ACR can be turned off, set to automatic, or manually closed.

Automatic Operation

Automatic closure occurs when the higher battery has remained at the required voltage for at least 30 seconds. The ACR opens when the voltage drops below the charging voltage to prevent accidental discharge of an unintended bank.

Agency Standards

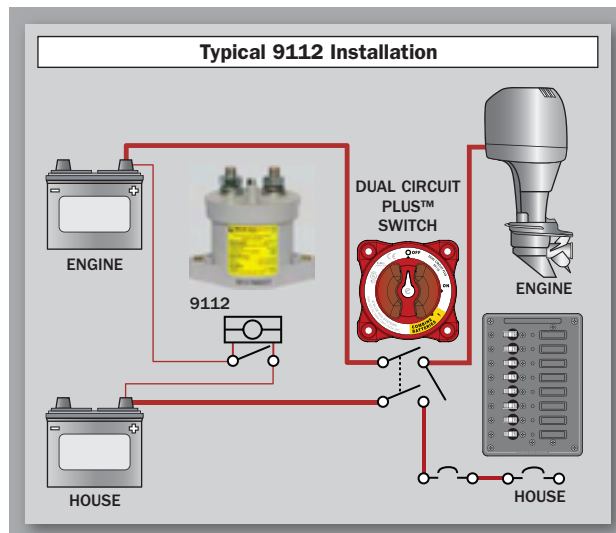
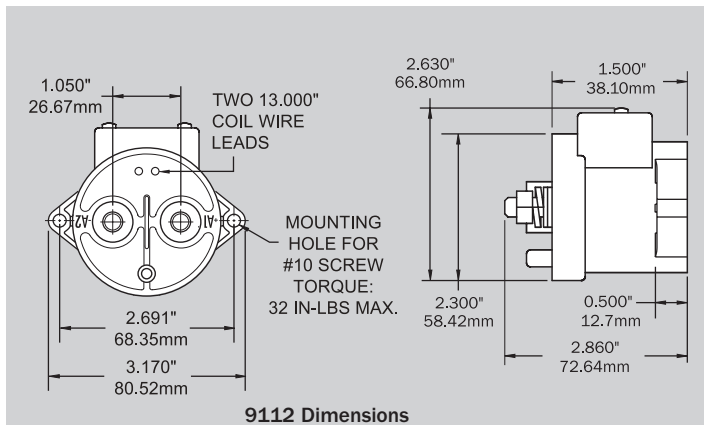
- Meets SAE J1171 external ignition protection requirements
- UL Recognized - UL 508 industrial control equipment

Wire Size	Cranking Rating 9.75 sec. (10 repeats)*	Intermittent Rating 5 min. (UL 1107)	Continuous Rating (UL 1107)
1/0	500A	275A	250A
2/0	500A	450A	300A
2x2/0	800A	600A	450A

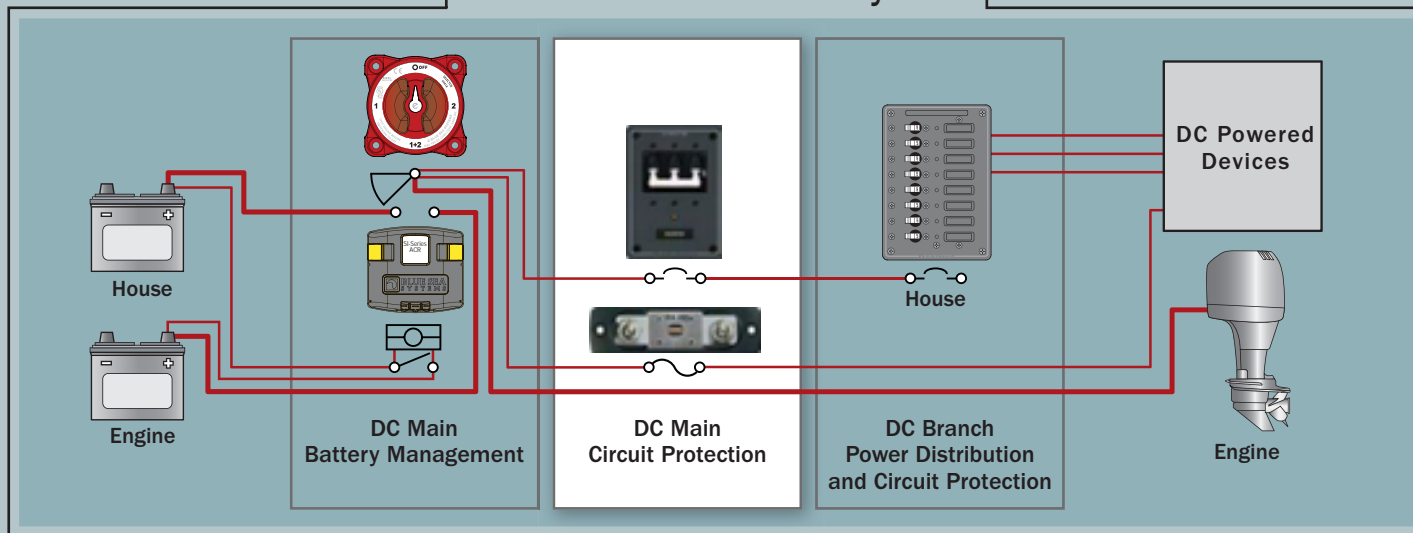
*Blue Sea Systems Engine Starting Standard (page 110)

PN	Description	Weight Lb (Kg)
9112	450 Ampere Class, 12/24 Volt ACR	0.95 (0.43)
8270	Switch Panel	0.27 (0.12)

IP IGNITION PROTECTED



DC Power Distribution System



DC Main Circuit Protection

Definition

DC main circuit protection consists of the fuses and circuit breakers that are closest to the battery.

Purpose

Fuses and circuit breakers are used to protect wire insulation from melting and starting fires in the event of a circuit overload, or to protect from short circuits which cause more amperage to flow in a wire than that wire is rated to handle. It is important to note that, except for those wires that are intended to carry starting currents, every positive wire in the DC Main power distribution system must be protected by a fuse or circuit breaker.

Considerations

What distinguishes DC main circuit protection from DC branch circuit protection is the ampere interrupt capacity (AIC) rating. AIC is defined as the fault current that a device is capable of breaking and remaining operational after the fault. In certain circumstances, main circuit protection devices may have to break very high amperages.

Circuit protection devices that qualify for main circuit protection must meet the AIC ratings found in the ABYC Interrupt Rating Table (page 113). Look for the Interrupt Ratings for the fuses and circuit breakers in this section.

Products in this Section

Circuit Breakers: Circuit breakers used for main circuit protection are single, double, and triple pole paralleled, and range in current rating from 3 to 300A. They have AIC ratings suitable for main circuit protection. Circuit breakers with lower current ratings and lower AIC ratings are found in the DC Branch Power Distribution and Circuit Protection section of this catalog.

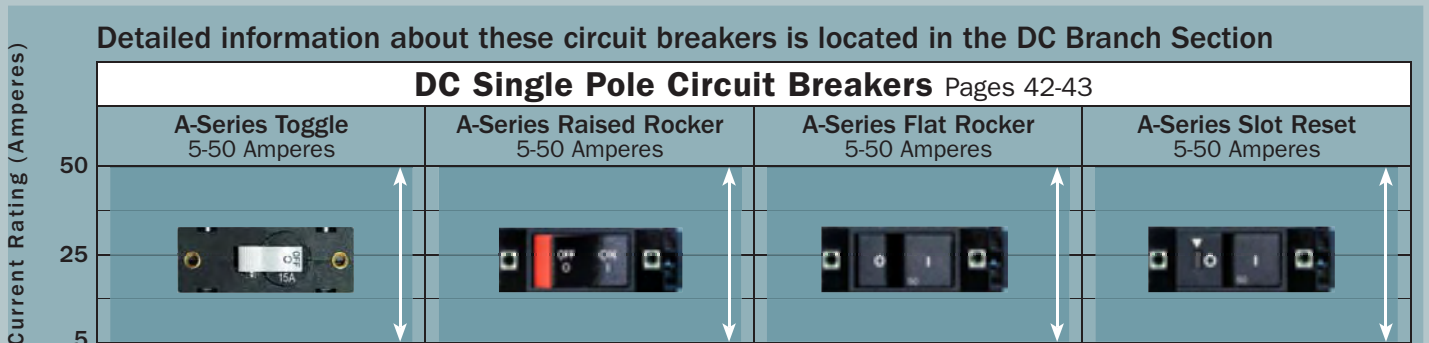
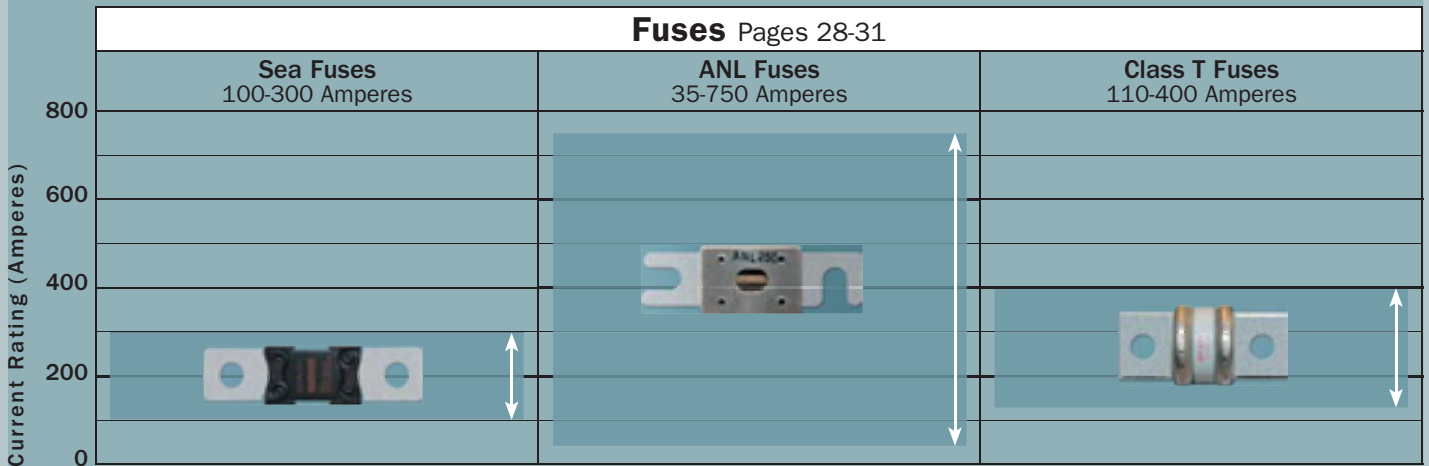
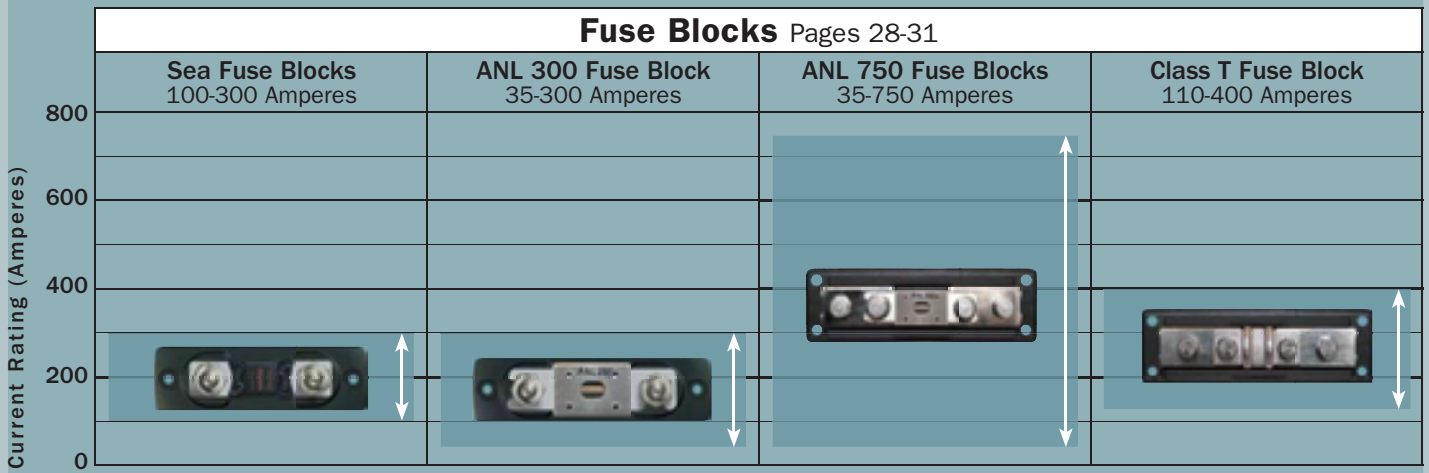
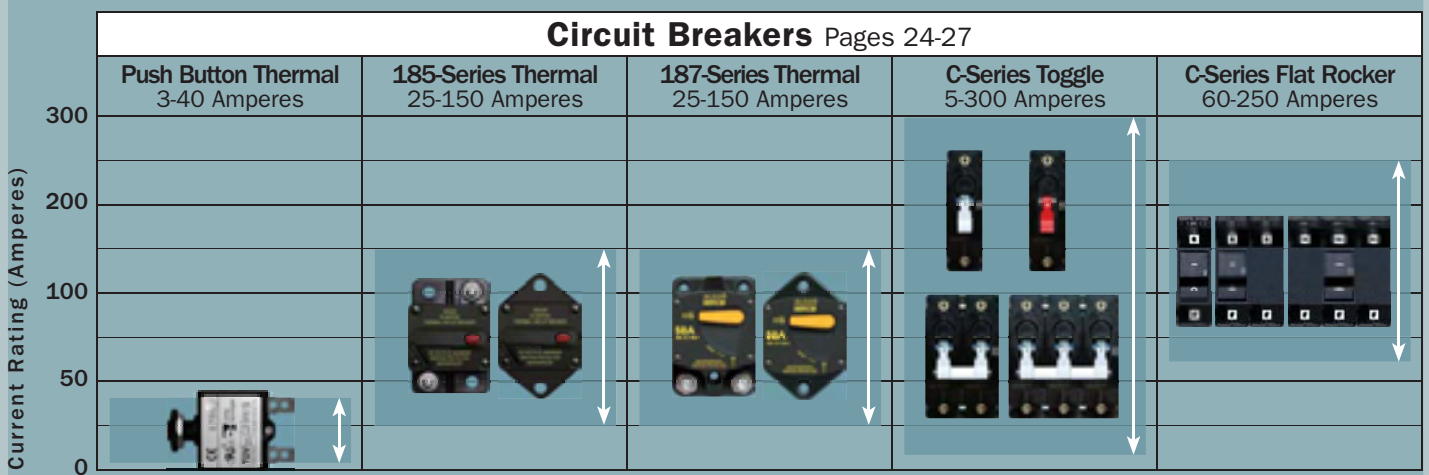
Fuse Blocks and Fuses: Fuses that have AIC ratings suitable for main circuit protection range in current rating from 35 to 750 Amperes. Fuses with lower current ratings and lower AIC ratings are found in the DC Branch Power Distribution and Circuit Protection section of this catalog.

For more information about selecting suitable DC main circuit protection, refer to pages 112-114 in this catalog.

Blue Sea Systems uses circuit breakers manufactured by Carling Technologies®, Airpax®, and Cooper Bussmann®.



DC MAIN CIRCUIT PROTECTION



Push Button Reset-Only Thermal Circuit Breakers

- Ideal for 24-hour circuit protection
- Incorporated into Blue Sea Systems' waterproof circuit breaker panels (pages 34-35, 38) and Battery Main Distribution Panels (pages 14-15)
- Compact design enables high density circuit protection configurations
- Push to reset operation
- "Trip Free" design cannot be held "ON" during fault current condition
- Ignition protected - safe for installation aboard gasoline powered boats
- Optional Push Button Waterproof Boot protects circuit breaker in wet environments, replaces dress nut mounting on circuit breakers, and resists discoloration and cracking

Specifications

Interrupt Rating	2,500 Amperes DC
Maximum Voltage	28 Volts DC
Circuit Breaker Type	Thermal trip, manual push button reset only
Operating Temperature Range	-10°C to +60°C
Trip Time Delay	See www.blueseasea.com
Weight Circuit Breaker	0.06Lb (0.03Kg)
Weight Waterproof Boots (package of 5)	0.04Lb (0.02Kg)
Boot Material	UV Resistant Silicone Rubber
Boot Thread Material	Nickel-Plated Brass
Boot Thread	3/8"-27

Certification

- CE marked

Agency Standards

- Meets UL 1500 and ISO 8846 external ignition protection requirements
- UL Recognized - UL 1077 - UL/cUL (USA and Canada)

▶ See page 113 for ABYC Interrupt Rating Requirements.

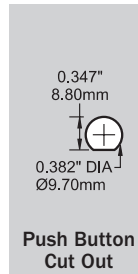


IP 7056

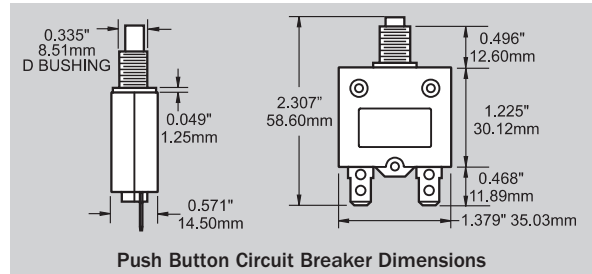


Push Button Boots	
PN	Color
4135	Clear
4136	White
4137	Black

Push Button Circuit Breakers	
PN	Amperage
7050	3A
7051	4A
7052	5A
7053	7A
7054	10A
7055	12A
7056	15A
7057	20A
7058	25A
7059	30A
7060	35A
7061	40A



Push Button Cut Out



Push Button Circuit Breaker Dimensions

185-Series Thermal Circuit Breakers

- Ignition protected - safe for installation aboard gasoline powered boats
- Weather Resistant
- Combines switching and circuit breaker function into one unit
- "Trip Free" - cannot be held closed after trip

Specifications

Interrupt Rating	3,000 Amperes DC
Maximum Voltage	42 Volts DC
Circuit Breaker Type	Thermally Responsive Bi-Metal Blade
Circuit Breaker Class	Type III - Switchable/Manual Reset - Trip Free
Operating Temperature Range	-25°C to +82°C
Terminal Stud Torque	70 in-lb
Trip Time Delay	See www.blueseasea.com
Case Material	Phenolic
Weight	Panel Mount 0.25 lb (0.11 Kg) Surface Mount 0.30 lb (0.14 Kg)

Certification

- CE marked

Agency Standards

- Meets SAE J1171 external ignition protection requirements

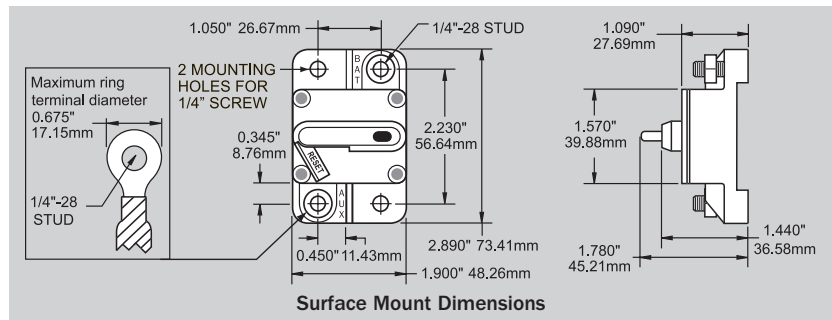
▶ See page 113 for ABYC Interrupt Rating Requirements.



IP 7010 Panel Mount

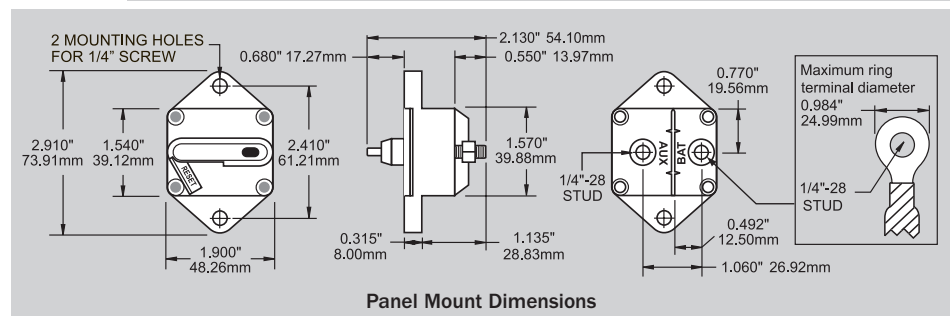


IP 7110 Surface Mount



Surface Mount Dimensions

Panel Mount		Surface Mount	
PN	Amperage	PN	Amperage
7008	25A	7108	25A
7009	30A	7109	30A
7010	35A	7110	35A
7005	40A	7105	40A
7000	50A	7100	50A
7011	60A	7111	60A
7012	70A	7112	70A
7014	80A	7114	80A
7006	90A	7106	90A
7002	100A	7102	100A
7007	110A	7107	110A
7013	120A	7113	120A
7015	135A	7115	135A
7004	150A	7104	150A

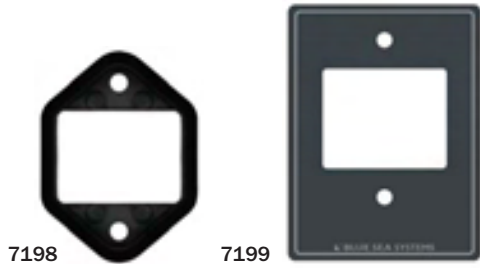


Panel Mount Dimensions



185-Series Thermal Circuit Breaker Mounting Panels

- Used with 185-Series Thermal Panel Mount Circuit Breakers (page 24)
- 7199 Heavy 1/8" aluminum 5052 Alloy
- 7199 Two-part polyurethane slate gray finish
- 7198 Self trimming molded rubber bezel



PN	Description	Height in" (mm)	Width in" (mm)	Weight Lb (Kg)
7198	Trim Bezel	3.34 (84.71)	2.44 (61.90)	0.04 (0.02)
7199	Mounting Panel	4.00 (101.60)	3.00 (76.20)	0.12 (0.05)

187-Series Thermal Circuit Breakers

- Ignition protected - safe for installation aboard gasoline powered boats
- Waterproof
- Combines switching and circuit protection into a single device
- Clear, single lever operation
- "Trip Free" design cannot be held "ON" during fault current condition
- Recessed mounting holes for clean appearance
- Robust 5/16" M8 terminals provide high torque connections

Specifications

Interrupt Rating:	5,000 Amperes@12 Volts DC 3,000 Amperes@24 Volts DC 1,500 Amperes@42 Volts DC
Maximum Voltage Rating	48 Volts DC
Circuit Breaker Type	Thermally Responsive Bi-Metal Blade
Circuit Breaker Class	Type III - Switchable/Manual Reset - Trip Free
Operating Temperature Range	-25°C to +82°C
Terminal Stud Torque	90 in-lb
Trip Time Delay	See www.blueseas.com
Case Material	Thermoset Polyester
Weight	Panel Mount 0.50 lb (0.23 Kg) Surface Mount 0.58 lb (0.26 Kg)

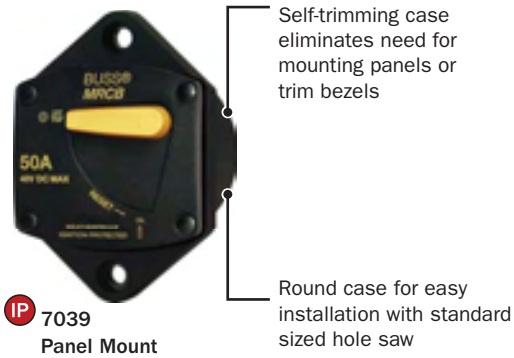
Certification

- CE marked

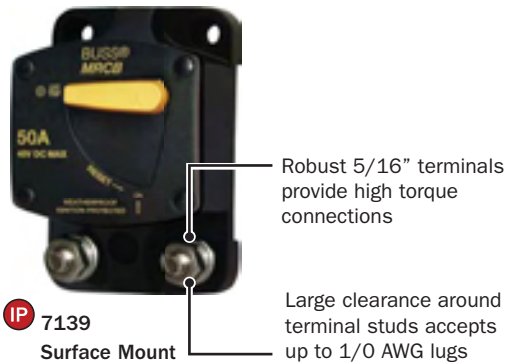
Agency Standards

- Meets SAE J1171 external ignition protection requirements

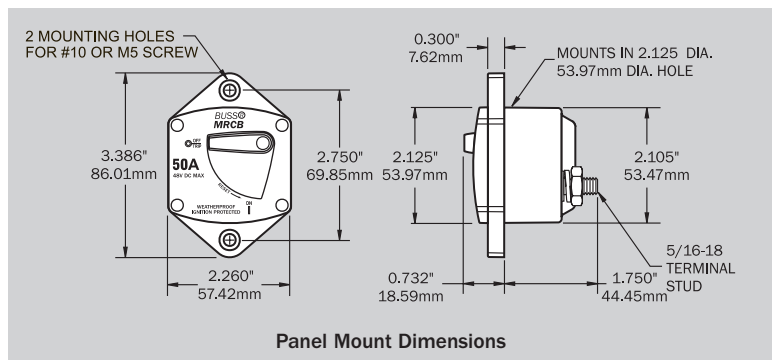
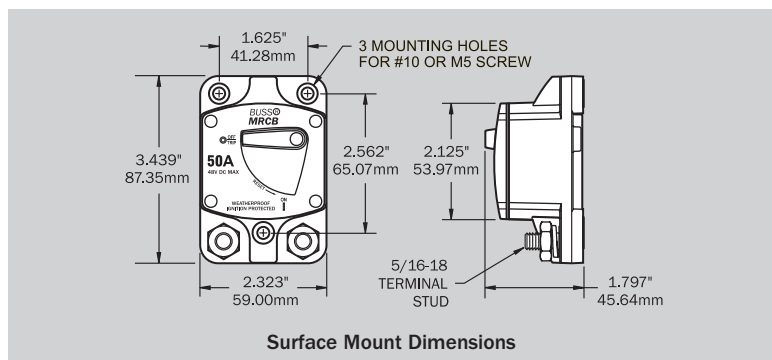
▶ See page 113 for ABYC Interrupt Rating Requirements.



IP 7039 Panel Mount



IP 7139 Surface Mount



Panel Mount		Surface Mount	
PN	Amperage	PN	Amperage
7035	25A	7135	25A
7036	30A	7136	30A
7037	35A	7137	35A
7038	40A	7138	40A
7039	50A	7139	50A
7040	60A	7140	60A
7041	70A	7141	70A
7042	80A	7142	80A
7043	90A	7143	90A
7044	100A	7144	100A
7045	110A	7145	110A
7046	120A	7146	120A
7047	135A	7147	135A
7048	150A	7148	150A

IP IGNITION PROTECTED

C-Series Toggle Circuit Breakers

- Provides overcurrent protection for inverters, bow thrusters, and windlasses
- Combines switching and circuit protection into a single device
- "Trip Free" - cannot be held closed after trip
- 7250I Ignition protected - safe for installation aboard gasoline powered boats
- 7250I meets UL 1500 and ISO 8846 external ignition protection requirements

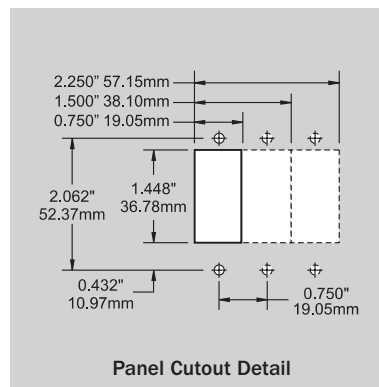
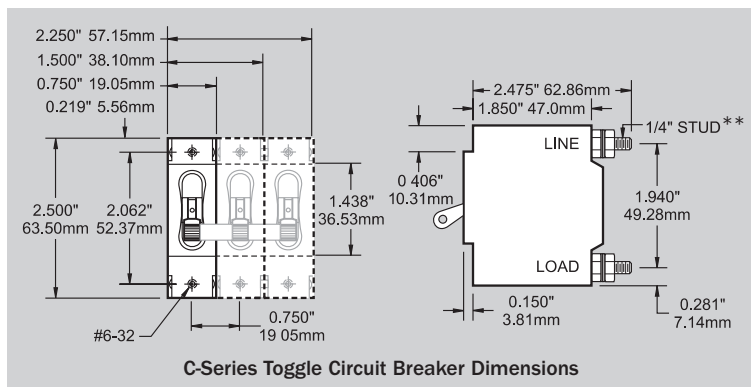
Specifications

Interrupt Rating	See Interrupt Ratings tables to right
Maximum Voltage	See Interrupt Ratings tables to right
Circuit Breaker Type	Magnetic Hydraulic
Operating Temperature Range	-40°C to +85°C
Terminal Stud	Stainless Steel 1/4"-20 - Maximum torque 35 in-lb
Trip Time Delay	See www.blueseasystems.com
Rated Switch Cycles	10,000 @ rated amperage and voltage
Case Material	Phenolic
Mounting Screw	Stainless Steel #6-32 - Recommended torque 6-8 in-lb

Agency Standards

- Meets SAE J1171 external ignition protection requirements - 7250I Only

PN	Color	Poles	Amperage	Weight Lb (Kg)	
7350	-	White	1*	5A	0.28 (0.13)
7351	-	White	1*	10A	0.28 (0.13)
7352	-	White	1*	15A	0.28 (0.13)
7353	-	White	1*	20A	0.28 (0.13)
7354	-	White	1*	25A	0.28 (0.13)
7355	-	White	1*	30A	0.28 (0.13)
7244	-	White	1*	50A	0.36 (0.17)
7246	-	White	1*	60A	0.36 (0.17)
7248	-	White	1*	80A	0.36 (0.17)
7250	-	White	1*	100A	0.36 (0.17)
7250I	IP	Red	1*	100A	0.36 (0.17)
7267	-	White	2	150A	0.64 (0.31)
7268	-	White	2	175A	0.64 (0.31)
7269	-	White	2	200A	0.64 (0.31)
7270	-	White	3	250A	0.93 (0.46)
7271	-	White	3	300A	0.93 (0.46)



- * Single pole circuit breakers are AC/DC rated
- ** Multiple pole versions have 5/16" stud on bus

▶ See page 27 for C-Series Toggle Circuit Breaker Mounting Panels.

C-Series Toggle Circuit Breaker Panels

- Heavy 1/8" aluminum 5052 Alloy
- Two-part polyurethane slate gray finish
- LED indicates power "ON"

Specifications

LED Power Consumption 5 Milliwatts

PN Panel	PN Circuit Breaker Installed	Poles	Amperage	Weight Lb (Kg)
7262	7267	2	150A	0.95 (0.45)
7263	7268	2	175A	0.95 (0.45)
7264	7269	2	200A	0.95 (0.45)
7265	7270	3	250A	1.21 (0.59)
7266	7271	3	300A	1.21 (0.59)



Interrupt Ratings (see ABYC Interrupt Rating Requirements page 113)

C-Series Toggle Circuit Breakers - Single Pole			
Voltage	Current	Interrupt Ratings	Interrupt Ratings
80V DC	5-100A	10,000A	5,000A
125V AC	5-100A	5,000A	5,000A
250V AC	5-100A	5,000A	5,000A

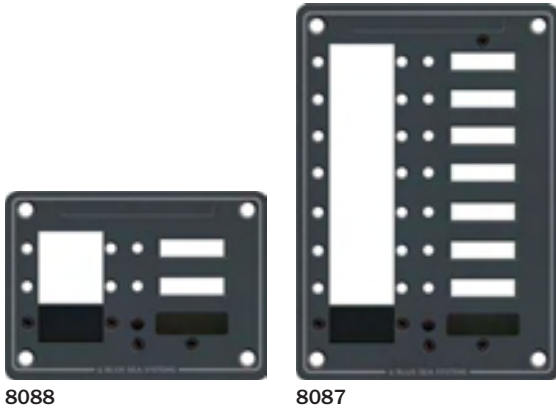
C-Series Toggle Circuit Breaker - 7250I Single Pole (Ignition Protected)			
Voltage	Current	Interrupt Ratings	Interrupt Ratings
48V DC	100A	5,000A	5,000A
125V AC	100A	1,500A	1,500A

C-Series Toggle Circuit Breakers - Double and Triple Pole			
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	150-300A	5,000A ²	-

- ¹ UL Recognized
- ² No Agency Approvals



7266



8088

8087

► See page 26 for C-Series Toggle Circuit Breakers.

C-Series Toggle Circuit Breaker Mounting Panels

- Designed for C-Series Toggle Circuit Breakers
- Heavy 1/8" aluminum 5052 Alloy
- Two-part polyurethane slate gray finish
- Accepts standard Blue Sea Systems' backlight labels (pages 83-87)
- Accepts standard Blue Sea Systems "ON" indicating LEDs (page 79)
- Industry standard height and width
- Panel Plug Kit included
- Panel plugs can be inserted to fill blank positions
- Panel Plug Kit 8089 includes Circuit Breaker Mounting Screws, panel plug, LED plug, and blank label

PN	Description	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)
8087	8 Position	5.25 (133.35)	7.50 (190.50)	0.40 (0.18)
8088	3 Position	5.25 (133.35)	3.75 (95.25)	0.24 (0.11)
8089	Panel Plug Kit	-	-	0.10 (0.04)

C-Series Flat Rocker Circuit Breakers

- Colored actuator indicates "OFF" position
- Rocker actuator is flush in the "ON" position, eliminating the risk of accidental switching
- "Trip Free" design cannot be held "ON" during fault current condition
- International ON/OFF symbols support vertical or horizontal mounting

Specifications

Interrupt Rating	See Interrupt Rating tables below
Maximum Voltage	See Interrupt Rating tables below
Circuit Breaker Type	Magnetic Hydraulic - Trip free
Operating Temperature Range	-40°C to +85°C
Terminal Stud	Stainless Steel 1/4"-20 x 0.545" - Recommended torque 40-45 in-lb
Trip Time Delay	See www.blueseas.com
Rated Switch Cycles	10,000@rated amperage and voltage
Mounting Screw	Stainless Steel #6-32 - Recommended torque 6-8 in-lb

Certification

- CE marked

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 113)

C-Series Flat Rocker Circuit Breakers - Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - VDE (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	60-100A	7,500A	-
65V DC	60A	-	4,000A

C-Series Flat Rocker Circuit Breakers - Double and Triple Pole			
		UL 489A - UL/CSA (US/Canada) ²	EN60934 - VDE (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
80V DC	150-250A	10,000A	2,000A

¹ UL Recognized ² UL Listed



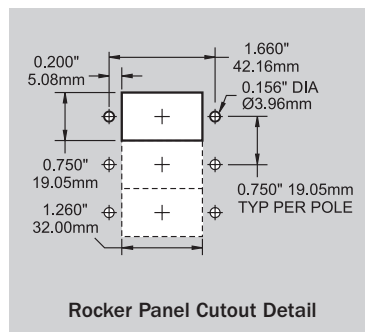
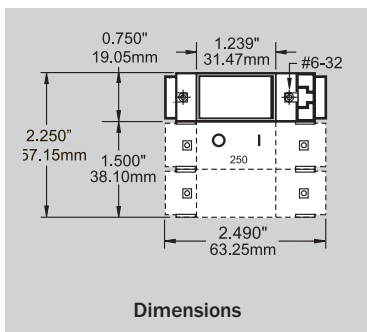
7450



7475



7477



PN	Actuator	Poles	Amperage	Weight Lb (Kg)
7450	Flat Rocker	1	60A	0.26 (0.12)
7451	Flat Rocker	1	80A	0.26 (0.12)
7452	Flat Rocker	1	100A	0.26 (0.12)
7475	Flat Rocker	2*	150A	0.42 (0.19)
7476	Flat Rocker	2*	200A	0.42 (0.19)
7477	Flat Rocker	3*	250A	0.62 (0.28)
4110	Panel Plug Kit	-	-	-

* Paralleled Poles

SEA Fuse Blocks

Insulating cover satisfies ABYC/USCG insulation requirements and protects conductive components

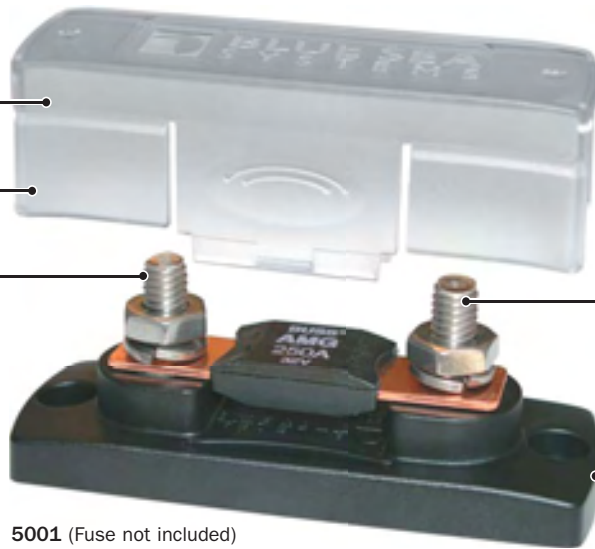
Cover breakouts allow wire access in any direction

Insert molded studs ensure secure fuse mounting

5/16" (M8) studs accept 14 AWG to 2/0 AWG wire

Stainless steel studs provide resistance to corrosion and allow high torque for excellent electrical contact

UL 94-V0 base resists high heat



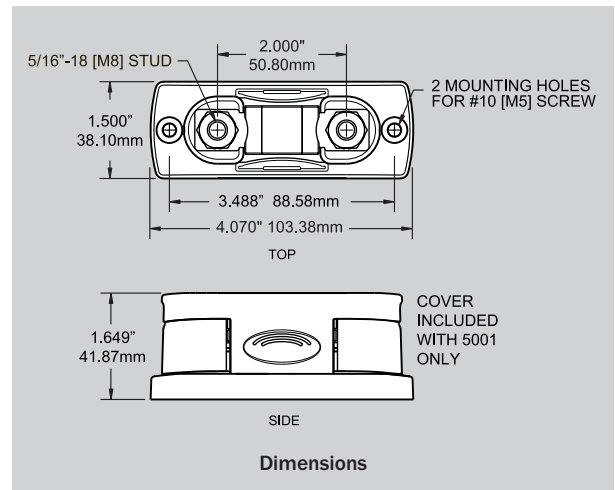
5001 (Fuse not included)

- The most economical system for 100-300 Ampere fusing
- Insulating cover satisfies ABYC/USCG insulation requirements
- For use on systems up to 32 Volts DC
- 5/16"-18 studs accept 5/16" (M8) ring terminals, 14 AWG to 2/0 AWG wire

Specifications

Maximum Amperage	300 Amperes DC
Maximum Voltage	32 Volts DC
Recommended Torque	132 in-lb (14.9 N-m)
Base Material	Reinforced PBT
Cover Material	Polycarbonate
SEA Fuses available	100-300 Amperes DC

PN	Description	Amperage	Weight Lb (Kg)
5000	Fuse Block without Cover	100-300A	0.17 (0.07)
5001	Fuse Block with Cover	100-300A	0.35 (0.16)



SEA Fuses

- Most economical fuse for 100-300 Ampere circuit protection

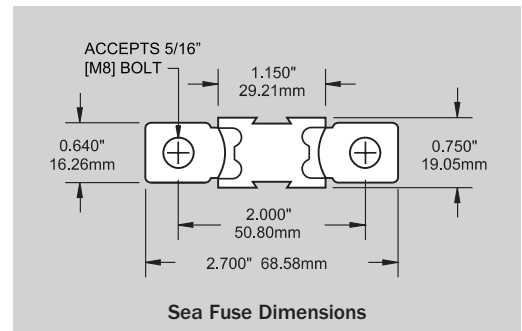
Specifications

Interrupt Rating	2,000 Amperes DC
Maximum Voltage	32 Volts DC
Trip Time Delay	See www.blueseasea.com

PN	Amperage	Weight Lb (Kg)
5101	100A	0.06 (0.03)
5102	125A	0.06 (0.03)
5103	150A	0.06 (0.03)
5104	175A	0.06 (0.03)
5105	200A	0.06 (0.03)
5106	225A	0.06 (0.03)
5107	250A	0.06 (0.03)
5108	300A	0.06 (0.03)



5106



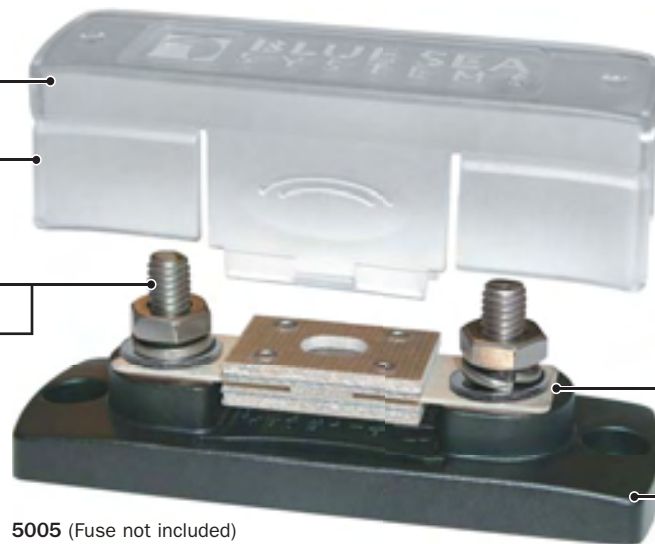
ANL 300 Fuse Blocks

Insulating cover satisfies ABYC/USCG insulation requirements and protects conductive components

Cover breakouts allow wire access in any direction

Insert molded 5/16"-18 studs ensure secure fuse mounting and accept 5/16" (M8) ring terminals, 14 AWG to 2/0 AWG wire

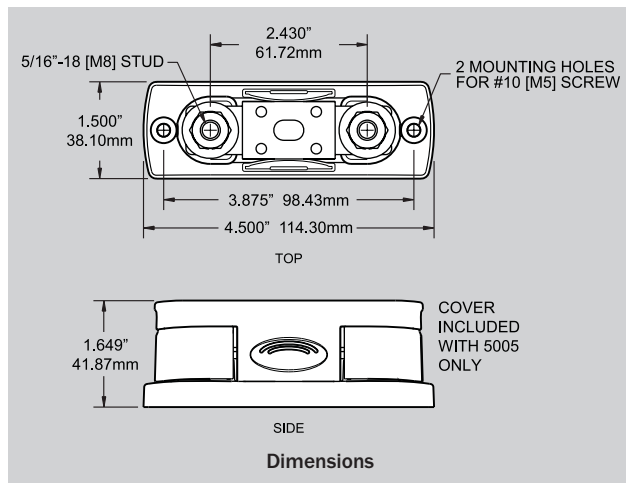
Stainless steel studs provide resistance to corrosion and high torque for excellent electrical contact



Swing out design allows replacement of the fuse without removing fasteners

UL 94-V0 base resists high heat

5005 (Fuse not included)

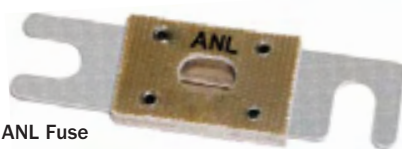


- Insulating cover satisfies ABYC/USCG insulation requirements
- For use on systems up to 32 Volts DC
- Large 5/16"-18 studs accept 5/16" (M8) ring terminals, 14 AWG to 2/0 AWG wire

Specifications

Maximum Amperage	300 Amperes DC
Maximum Voltage	32 Volts DC
Terminal Stud Torque	132 in-lb (14.9 N-m)
Base Material	Reinforced PBT
Cover Material	Polycarbonate
ANL Fuses Available	35-300 Amperes

PN	Description	Amperage	Weight Lb (Kg)
5004	Fuse Block without Cover	35-300A	0.18 (0.08)
5005	Fuse Block with Cover	35-300A	0.35 (0.16)



ANL Fuse

35-300 Ampere ANL Fuses

- 6,000 Ampere Interrupt Rating satisfies ABYC requirements for main DC circuit protection on large battery banks
- Ignition protected - safe for installation aboard gasoline powered boats
- Silver-plated connector blades for corrosion resistance
- Visible indication of blown fuse condition

Specifications

Interrupt Rating	6,000 Amperes DC
Maximum Voltage	32 Volts DC
Trip Time Delay	See www.blueseas.com

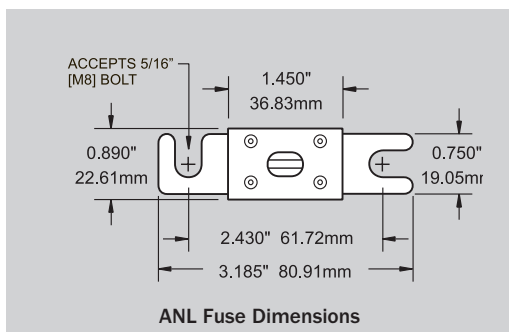
Certifications

- CE marked, ISO 8846

Agency Standards

- Meets SAE J1171 external ignition protection requirements (35-300 Amperes only)
- USCG Title 33 CFR 183.410(a) and UL 1500 (35-500 Amperes only)

▶ See page 30 for high amperage ANL Fuses.



PN	Amperage	Weight Lb (Kg)	PN	Amperage	Weight Lb (Kg)
5164	IP 35A	0.05 (0.02)	5127	IP 150A	0.06 (0.03)
5165	IP 40A	0.05 (0.02)	5128	IP 175A	0.06 (0.03)
5122	IP 50A	0.05 (0.02)	5129	IP 200A	0.06 (0.03)
5123	IP 60A	0.05 (0.02)	5130	IP 225A	0.06 (0.03)
5124	IP 80A	0.05 (0.02)	5131	IP 250A	0.07 (0.03)
5125	IP 100A	0.05 (0.02)	5132	IP 275A	0.07 (0.03)
5126	IP 130A	0.05 (0.02)	5133	IP 300A	0.07 (0.03)



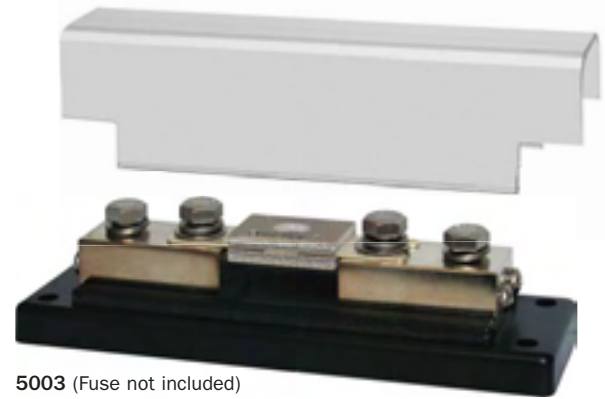
ANL Fuse Block

- Insulating cover satisfies ABYC/USCG insulation requirements
- For use on systems up to 32 Volts DC
- Large terminals accept 5/16" or M8 ring terminals up to 4/0 AWG

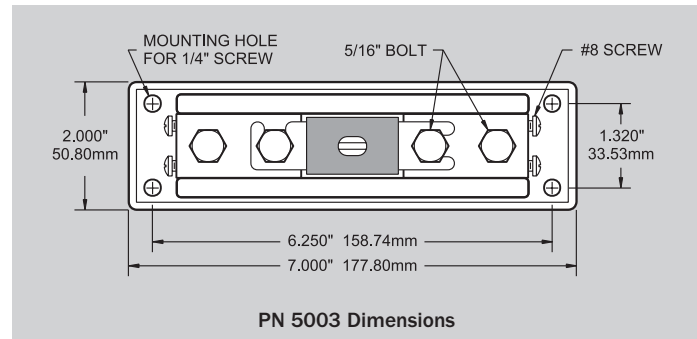
Specifications

Maximum Voltage	32 Volts DC
Maximum Amperage	750 Amperes DC
Base Material	Reinforced Polycarbonate
Cover Material	Polycarbonate
Fuse Mounting Blocks	Tin-Plated Copper
ANL Fuses Available	35-750 Amperes

PN	Amperage	Weight Lb (Kg)
5003	35-750A	1.45 (0.66)



5003 (Fuse not included)



PN 5003 Dimensions

35-750 Ampere ANL Fuses

- 6,000 Ampere Interrupt Capacity (AIC) satisfies ABYC requirements for main DC circuit protection on large battery banks
- Ignition protected - safe for installation aboard gasoline powered boats (35-500 Amperes only)
- Silver-plated connector blades for corrosion resistance
- Visible indication of blown condition

Specifications

Interrupt Rating	6,000 Amperes DC
Maximum Voltage	32 Volts DC
Trip Time Delay	See www.blueseas.com

Certifications

- CE marked, ISO 8846

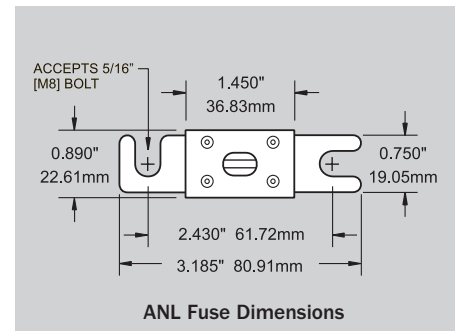
Agency Standards

- Meets SAE J1171 external ignition protection requirements (35-500 Amperes only)
- USCG Title 33 CFR 183.410(a) and UL 1500 (35-500 Amperes only)

PN	IP	Amperage	Weight Lb (Kg)
5164	IP	35A	0.05 (0.02)
5165	IP	40A	0.05 (0.02)
5122	IP	50A	0.05 (0.02)
5123	IP	60A	0.05 (0.02)
5124	IP	80A	0.05 (0.02)
5125	IP	100A	0.05 (0.02)
5126	IP	130A	0.05 (0.02)
5127	IP	150A	0.06 (0.03)
5128	IP	175A	0.06 (0.03)
5129	IP	200A	0.06 (0.03)
5130	IP	225A	0.06 (0.03)
5131	IP	250A	0.07 (0.03)
5132	IP	275A	0.07 (0.03)
5133	IP	300A	0.07 (0.03)
5134	IP	325A	0.07 (0.03)
5135	IP	350A	0.07 (0.03)
5136	IP	400A	0.08 (0.04)
5137	IP	500A	0.08 (0.04)
5161	-	600A	0.08 (0.04)
5162	-	675A	0.08 (0.04)
5163	-	750A	0.08 (0.04)



ANL Fuse



ANL Fuse Dimensions

IP IGNITION PROTECTED

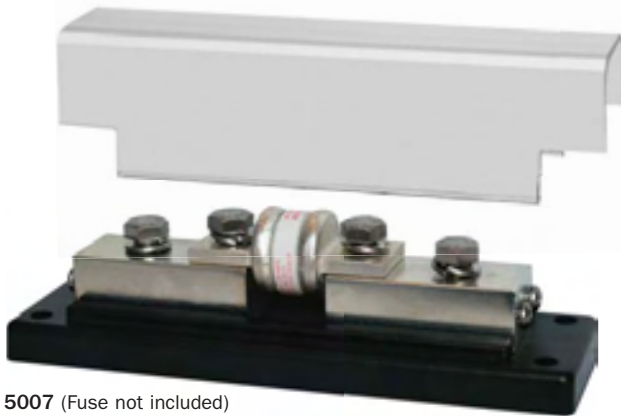
Class T Fuse Blocks

The fuse system recommended by most inverter manufacturers for high speed response to short circuits.

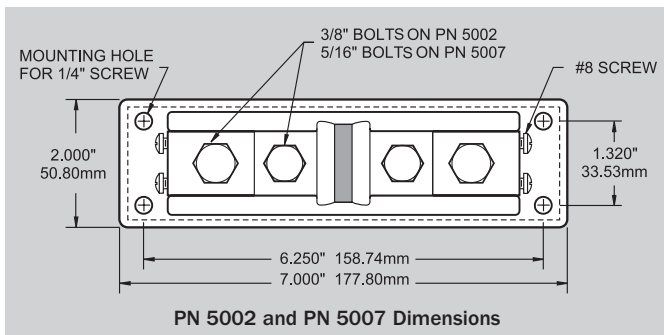
- Clear insulating cover, satisfies ABYC/USCG requirements
- For use on systems up to 160 Volts DC
- Large terminals (3/8" on 5002, 5/16" on 5007) accept ring terminals for wire up to 4/0 AWG
- Large heat dissipating tin-plated copper mounting blocks
- Two #8 accessory terminals located on each end

Specifications

Maximum Voltage	160 Volts DC
Maximum Amperage	400 Amperes DC
Base Material	Reinforced Polycarbonate
Cover Material	Polycarbonate
Fuse Mounting Blocks	Tin-Plated Copper
Class T Fuses available	110-400 Amperes DC



5007 (Fuse not included)



PN	Amperage	Weight Lb (Kg)	Accepts Fuse PN
5007	110-200A	1.40 (0.64)	5112, 5113, 5114, 5115, 5116
5002	225-400A	1.55 (0.70)	5117, 5118, 5119, 5120, 5121

Class T Fuses

- 20,000 Ampere Interrupt Rating
- Extremely fast short-circuit response

Specifications

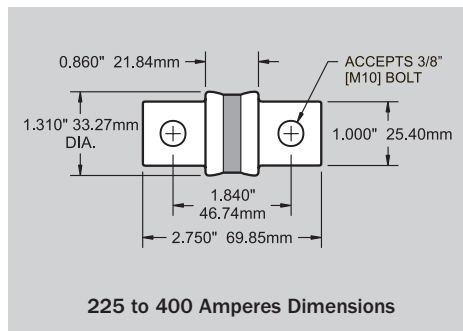
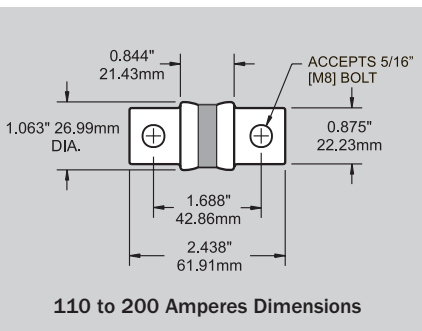
Interrupt Rating	20,000 Amperes DC
Maximum Voltage	160 Volts DC
Trip Time Delay	See www.blueseas.com

Agency Standards

- UL listed to standard 248-15
- DC tested to UL standard 198L



5112



PN	Amperage	Weight Lb (Kg)
5112	110A	0.19 (0.09)
5113	125A	0.19 (0.09)
5114	150A	0.19 (0.09)
5115	175A	0.19 (0.09)
5116	200A	0.19 (0.09)
5117	225A	0.30 (0.14)
5118	250A	0.30 (0.14)
5119	300A	0.30 (0.14)
5120	350A	0.30 (0.14)
5121	400A	0.30 (0.14)

ANL Fuses vs. Class T Fuses

What is the difference between an ANL and a Class T fuse?

These two fuses are the most common high amperage fuses used in marine applications and there are significant differences between the two:

ANL Fuse Advantages:

- Lower cost than Class T fuses
- Available in a wider amperage range (35A-750A) than Class T Fuses
- Single mounting hole dimension allows all ANL Fuses to be used with the same fuse block
- Fusible link window gives visual indication of fuse being blown
- Ignition protected - safe for installation aboard gasoline powered boats

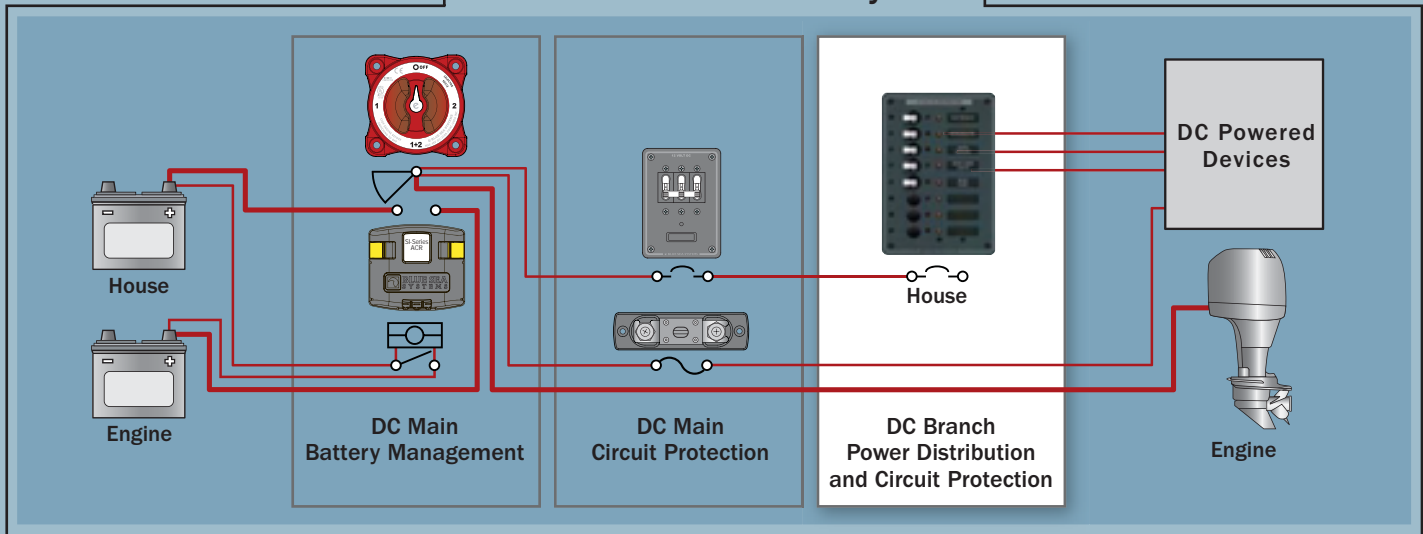


Class T Fuse Advantages:

- The only UL 248-15 listed fuse commonly available in the marine industry
- Fast response to short circuits protects high amperage electronic equipment such as inverters



DC Power Distribution System



DC Branch Power Distribution and Circuit Protection

Definition

The portion of the DC power distribution system that conducts power from the DC Main Circuit Protection to the load devices at the end of the circuit. Typically, the DC Branch Distribution System carries lower DC current, roughly currents below 50 Amperes.

Purpose

The distribution of high amperages from a single cable into lower amperages with multiple wires, circuit protection, and switching. These three functions may be consolidated into a single device as in the case of a circuit breaker distribution panel, or each function may reside in separate devices.

Products in this Section

WeatherDeck™ Waterproof Circuit Breaker Panels and Fuse Panels are designed for flybridge and open cockpit applications. They contain toggle switches, backlit circuit labels, and either push-button-reset circuit breakers or blade fuses. These panels are rated IP67—temporary immersion for 30 minutes.

Contura Waterproof Circuit Breaker Panels and Fuse Panels also are designed for flybridge and open cockpit applications. They contain water resistant ON/OFF Contura switches with embedded ON-indicating LEDs, and either push-button-reset circuit breakers or glass fuses. Contura Waterproof panels are available with 3, 4, 6, and 8 circuit positions. These panels are rated IP66—able to withstand water from heavy seas.

A-Series Circuit Breaker Panels: There are a wide variety of circuit breaker panels for below deck applications. They are available with either rocker or toggle circuit breakers. Panels are available with 3 to 35 circuits, some panels have analog or digital meters, and some have main circuit protection.

Fuse Blocks and Fuses: Blue Sea Systems' multi-circuit fuse blocks are available for below deck applications. ST Glass Fuse Blocks have 6 circuits and are available with and without negative bus. ST Blade Fuse Blocks are available with 6 or 12 circuits, and with and without negative bus. Maxi fuse blocks are economical and convenient single circuit devices.

Circuit Breakers: Blue Sea Systems' single pole circuit breakers for branch circuit protection range in current rating from 3 to 100A, and are available in toggle, rocker, and push button thermal models.

Look for the Interrupt Ratings for the fuses and circuit breakers in this section.




Circuit breakers and fuses with higher current ratings and AIC ratings are found in DC Main Circuit Protection.

For more information about selecting suitable DC branch circuit protection, refer to pages 112-114 in this catalog.

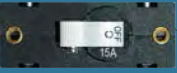

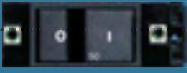
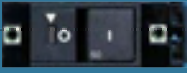
Blue Sea Systems uses circuit breakers manufactured by Carling Technologies®, Airpax®, and Cooper Bussmann®.



Circuit Protected Panels Pages 34-41



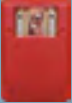
WeatherDeck™ Waterproof Panels	Contura Waterproof Panels	A-Series Circuit Breaker Panels
		

Single Pole Circuit Breakers Pages 42-43



A-Series Toggle 5-50 Amperes	A-Series Raised Rocker 5-50 Amperes	A-Series Flat Rocker 5-50 Amperes	A-Series Slot Reset 5-50 Amperes
			

Current Rating (Amperes) scale: 0, 25, 50

Fuse Blocks Pages 44-46

ST Glass Fuse Block	ST Blade Fuse Block	MAXI™ Fuse Block
		

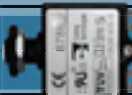
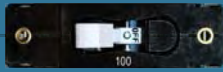
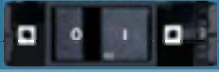
Fuses Pages 47

ATO/ATC 1-30 Amperes	Maxi 30-80 Amperes
	

Current Rating (Amperes) scale: 0, 25, 50, 100

Detailed information about these circuit breakers is located in the DC Main Section

DC Main Circuit Breakers Pages 24-27

Push Button Thermal 3-40 Amperes	C-Series Toggle Single Pole 5-100 Amperes	C-Series Flat Rocker Single Pole 60-100 Amperes
		

Current Rating (Amperes) scale: 0, 50, 100

WeatherDeck™ Waterproof Circuit Breaker Panels

- Designed for flybridge and open cockpit applications
- Designed for 12 or 24 Volt systems
- Constructed from corrosion resistant materials
- Integrated Push Button Reset Only Thermal Circuit Breakers for circuit protection
- Independent label backlighting allows switching and dimming
- Backlighting is compatible with all Blue Sea Systems' Digital Dimmers (page 81)
- UV stabilized and weather resistant faceplate
- Rated IP67-temporary immersion for 30 minutes
- Rugged UV stabilized waterproof boots
- Green LEDs illuminate circuit labels
- Panels can be mounted in four different orientations (page 35)
- Available in 4 and 6 circuit models
- Includes 4215 - 30 Square Format Labels (page 82)

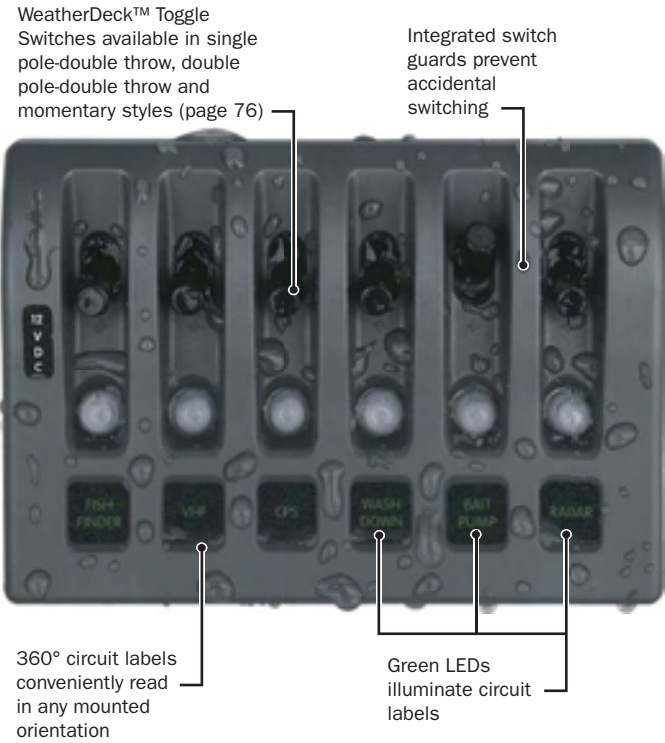
Specifications

Maximum Voltage	24 Volts DC
Maximum Amperage Per Circuit	15 Amperes @ 12 Volts DC 9 Amperes @ 24 Volts DC
Panel Cumulative Rating	45 Amperes
Switch Type	OFF/ON Toggle (page 78)
Switch Rating	15 Amperes Maximum
Backlighting Voltage	12 Volts DC Nominal
Backlighting Amperage Draw	10mA/Illuminated Circuit
Circuit Breaker Type	Thermal Trip, Manual Reset Only with waterproof boot (page 24)
Circuit Breaker Rating	15 Amperes
Panel Material	Reinforced Thermoplastic
Cover Material	UV Resistant Thermoplastic

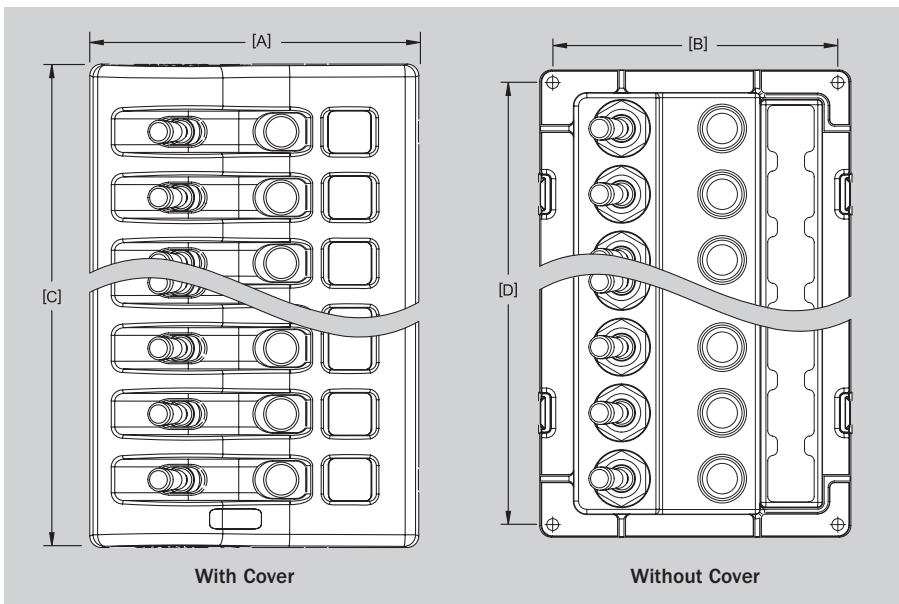
Agency Standards

- Rated IP67-temporary immersion per IEC60529-degree of protection provided by enclosure

Waterproof rated IP67-temporary immersion for 30 minutes



PN	Color	Description	[A] Width in" (mm)	[B] Mounting Centers in" (mm)	[C] Height in" (mm)	[D] Mounting Centers in" (mm)	Weight Lb (Kg)
4374	Gray	4 Position	4.25 (107.95)	3.69 (93.73)	4.30 (109.22)	3.74 (95.00)	0.97 (0.44)
4376	Gray	6 Position	4.25 (107.95)	3.69 (93.73)	6.00 (152.40)	5.44 (138.18)	1.36 (0.62)
4384	White	4 Position	4.25 (107.95)	3.69 (93.73)	4.30 (109.22)	3.74 (95.00)	0.97 (0.44)
4386	White	6 Position	4.25 (107.95)	3.69 (93.73)	6.00 (152.40)	5.44 (138.18)	1.36 (0.62)



4 Position - Gray



4374

4 Position - White



4384

6 Position - Gray



4376

6 Position - White

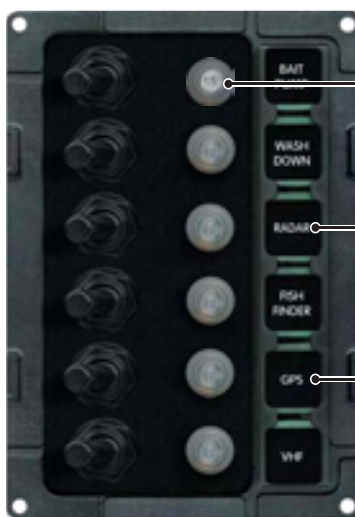


4386

► For high volume applications contact Blue Sea Systems about custom configurations. Call 1-800-222-7617 for information.



UV stabilized faceplate snaps on and off, providing access to components, and concealing mounting screws



Waterproof boots protect Carling PushButton Circuit Breakers

Labels can be rotated 360°

30 Square Format Panel Labels included for circuit identification (page 82)

Four Mounting Orientations



Panels can be mounted in 4 orientations to expand location possibilities - Circuit labels can be applied accordingly.

WeatherDeck™ Waterproof Fuse Panels

- Designed for flybridge and open cockpit applications
- Designed for 12 Volt systems
- Constructed from corrosion resistant materials
- Integrated ATO/ATC fuse based circuit protection
- Independent label backlighting circuit for remote switching and dimming
- Backlighting is compatible with all Blue Sea Systems' Digital Dimmers (page 81)
- UV stabilized and weather resistant faceplate
- Rated IP67-temporary immersion for 30 minutes
- Rugged UV stabilized waterproof boots
- Panels can be mounted in four different orientations (page 37)
- Available in 2, 4, 6, and 8 circuit models
- Includes 4215 - 30 Square Format Labels (page 82)

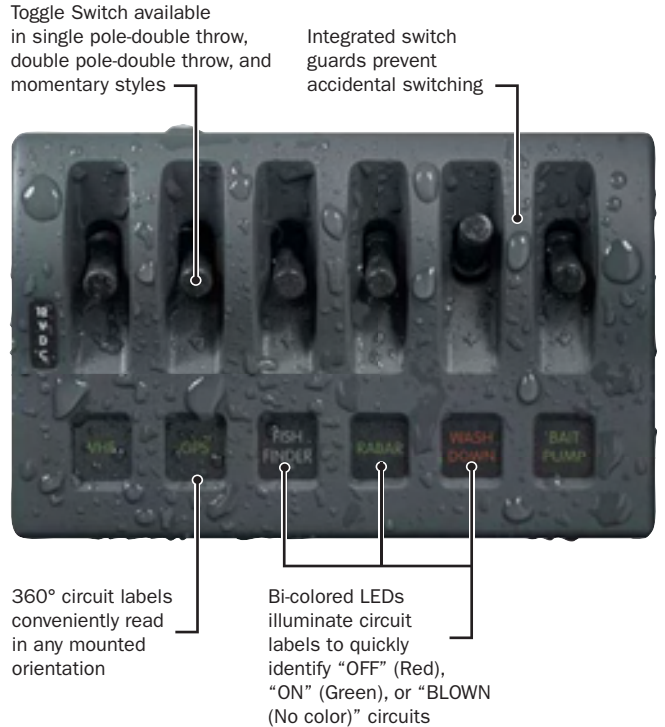
Specifications

Maximum Voltage	12 Volts DC
Maximum Amperage Per Circuit	15 Amperes
Panel Cumulative Rating	2 Position - 30 Amperes
	4 Position - 60 Amperes
	6 Position - 90 Amperes
	8 Position - 100 Amperes
	OFF/ON Toggle with waterproof boot (page 78)
Switch Type	15 Amperes maximum
Switch Rating	12 Volts DC Nominal
Backlighting Voltage	10mA/Illuminated Circuit
Backlighting Current	ATO/ATC Automotive Blade-Type
Fuse Type	1-40 Amperes
Fuses Available	Reinforced Thermoplastic
Panel Material	UV Resistant Thermoplastic
Cover Material	

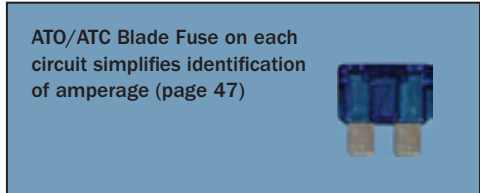
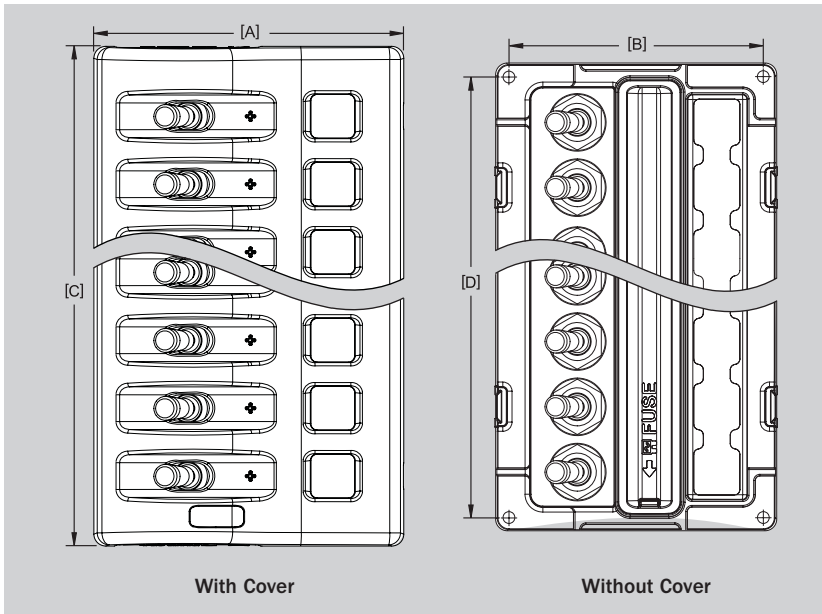
Agency Standards

- Rated IP67-temporary immersion per IEC60529-degree of protection provided by enclosure

Waterproof rated IP67-temporary immersion for 30 minutes



PN	Color	Description	[A] Width in" (mm)	[B] Mounting Centers in" (mm)	[C] Height in" (mm)	[D] Mounting Centers in" (mm)	Weight Lb (Kg)
4302	Gray	2 Position	3.88 (98.55)	3.31 (84.07)	2.60 (66.04)	2.04 (51.82)	0.52 (0.24)
4304	Gray	4 Position	3.88 (98.55)	3.31 (84.07)	4.30 (109.22)	3.74 (95.00)	0.90 (0.41)
4306	Gray	6 Position	3.88 (98.55)	3.31 (84.07)	6.00 (152.40)	5.44 (138.18)	1.15 (0.52)
4308	Gray	8 Position	3.88 (98.55)	3.31 (84.07)	7.70 (195.58)	7.14 (181.36)	1.55 (0.70)
4312	White	2 Position	3.88 (98.55)	3.31 (84.07)	2.60 (66.04)	2.04 (51.82)	0.52 (0.24)
4314	White	4 Position	3.88 (98.55)	3.31 (84.07)	4.30 (109.22)	3.74 (95.00)	0.90 (0.41)
4316	White	6 Position	3.88 (98.55)	3.31 (84.07)	6.00 (152.40)	5.44 (138.18)	1.15 (0.52)
4318	White	8 Position	3.88 (98.55)	3.31 (84.07)	7.70 (195.58)	7.14 (181.36)	1.55 (0.70)



2 Position - Gray



4302

4 Position - Gray



4304

6 Position - Gray



4306

8 Position - Gray



4308

8 Position - White



4318

6 Position - White



4316

4 Position - White



4314

2 Position - White



4312

► For high volume applications contact Blue Sea Systems about custom configurations. Call 1-800-222-7617 for information.



UV stabilized faceplate snaps on and off, providing access to components, and concealing mounting screws



Fuses are easily accessed from the front of the panel

Labels can be rotated 360° according to mounting orientation

30 Square Format Labels included for circuit identification (page 82)

Fuses fully sealed with silicone rubber cover

Four Mounting Orientations



Panels can be mounted in 4 orientations to expand location possibilities - Circuit labels can be applied accordingly.

Contura Waterproof Circuit Breaker Panels **IP**

- Designed for flybridge and open cockpit applications
- Designed for 12 or 24 Volt systems
- ON-OFF Contura Switches
- Watertight mounting gasket
- Rated IP66-withstands water from heavy seas
- Push Button Circuit Breaker with waterproof boot (page 24)
- Ignition protected - safe for installation aboard gasoline powered boats
- Countersunk mounting holes throughout
- Heavy 1/8" aluminum material
- Two-part polyurethane white or black finish
- "ON" indicating LEDs embedded in switch
- MIL-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
- Completely wired and ready to install
- Includes set of 60 Small Format Labels (page 83)

NOTE: Waterproof panel labels are not backlit

Specifications

Maximum Voltage	24 Volts DC
Switch Rating	20 Amperes@12 Volts DC 15 Amperes@24 Volts DC
Switch LED Amperage Draw	18 Milliampers each
Circuit Breaker Rating	15 Amperes
Panel Cumulative Rating	45 Amperes

Certifications

- **CE** marked

Agency Standards

- Rated IP66-temporary immersion per IEC60529-degree of protection provided by enclosure
- Meets UL 1500 and ISO 8846 ignition protection requirements

Rated IP66-withstands water from heavy seas

8 Position - Horizontal



8271

8 Position - Horizontal



8371

6 Position - Vertical



8273

6 Position - Vertical



8373

3 Position - Vertical



8274

4 Position - Horizontal



8272

3 Position - Vertical



8374

4 Position - Horizontal



8372

PN	Description	Color	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)
8274	3 Position - Vertical	White	4.50 (114.30)	3.75 (95.25)	0.75 (0.34)
8272	4 Position - Horizontal	White	5.25 (133.35)	4.25 (107.95)	0.90 (0.41)
8273	6 Position - Vertical	White	4.50 (114.30)	7.50 (190.50)	1.35 (0.61)
8271	8 Position - Horizontal	White	9.37 (238.00)	4.25 (107.95)	1.75 (0.79)
8374	3 Position - Vertical	Black	4.50 (114.30)	3.75 (95.25)	0.75 (0.34)
8372	4 Position - Horizontal	Black	5.25 (133.35)	4.25 (107.95)	0.90 (0.41)
8373	6 Position - Vertical	Black	4.50 (114.30)	7.50 (190.50)	1.35 (0.61)
8371	8 Position - Horizontal	Black	9.37 (238.00)	4.25 (107.95)	1.75 (0.79)

Rugged UV stabilized waterproof boots protect Push Button Reset Only Thermal Circuit Breakers (page 24)



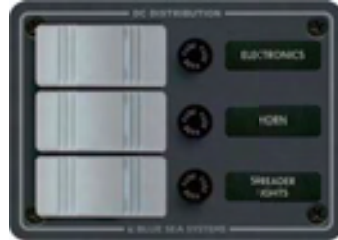
Rated IP66-withstands water from heavy seas

6 Position - Vertical



8053

3 Position - Vertical



8054

8 Position - Horizontal



8261

4 Position - Horizontal



8262

Contura Waterproof Fuse Panels

Common Features

- Designed for flybridge and open cockpit applications
- Designed for 12 or 24 Volt systems
- ON-OFF Contura Switches
- Watertight mounting gasket
- Rated IP66-withstands water from heavy seas
- Fuse holders accept commonly available AGC and MDL glass fuses
- Countersunk mounting holes throughout
- Heavy 1/8" aluminum material
- Two-part polyurethane slate gray finish
- "ON" indicating LEDs embedded in switches
- Industry standard height and width
- Mil-Spec chemical treatment via immersion to protect every surface detail from corrosion
- Completely wired and ready to install

NOTE: Waterproof panel labels are not backlit

Vertical Fuse Panel Features

- Includes set of 30 common Large Format Labels (page 83)
- Over 500 labels available (pages 84-87)

Horizontal Fuse Panel Features

- Designed for height restricted installations
- Compact labels minimize panel space requirements
- Includes set of 60 common Small Format Labels (page 83)

Specifications

Maximum Voltage	24 Volts DC
Switch Rating	20 Ampere@12 Volts DC 15 Ampere@24 Volts DC
Switch LED Amperage Draw	18 Milliampere each
Fuse Holder Rating	20 Amperes maximum
Panel Cumulative Rating	45 Amperes

Agency Standards

- Rated IP66-temporary immersion per IEC60529-degree of protection provided by enclosure

PN	Description	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)
8054	3 Position - Vertical	5.25 (133.35)	3.75 (95.25)	0.70 (0.32)
8053	6 Position - Vertical	5.25 (133.35)	7.50 (190.50)	1.20 (0.54)
8262	4 Position - Horizontal	5.25 (133.35)	3.75 (95.25)	0.75 (0.34)
8261	8 Position - Horizontal	9.37 (238.00)	3.75 (95.25)	1.40 (0.64)

Rated IP66-withstands water from heavy seas



8263

Contura Waterproof Bilge Pump Control Panel

- Designed for flybridge and open cockpit applications
- Designed for 12 or 24 Volt systems
- ON-OFF Contura Switches
- Watertight mounting gasket
- Rated IP66-withstands water from heavy seas
- Fuse holders accept commonly available AGC and MDL glass fuses
- Countersunk mounting holes throughout
- Heavy 1/8" aluminum material
- Two-part polyurethane slate gray finish
- "ON" indicating LEDs embedded in switches
- Industry standard height
- Mil-Spec chemical treatment via immersion to protect every surface detail from corrosion
- Completely wired and ready to install

NOTE: Waterproof panel labels are not backlit

Specifications

Specifications see Contura Waterproof Fuse Panels (See above)

Agency Standards

- Rated IP66-temporary immersion per IEC60529-degree of protection

PN	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)
8263	2.25 (57.15)	3.75 (95.25)	0.25 (0.11)

A-Series Circuit Breaker Panels

Common Features

- All positive, negative and grounding buses installed
- Panels with meters include toggle switch for monitoring up to 3 battery banks
- All panels with analog meters are owner upgradable to 24 Volts with 8240 or 8243 18-32V DC meters (page 94)
- All circuit label positions are backlit on standard panels - No kit required
- "ON" indicating LEDs installed in all circuit positions
- MIL-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance

▶ Toggle style panels available with white or black circuit breakers installed.

- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Industry standard height and width
- Countersunk mounting holes throughout
- Detailed installation instructions and cutout template included
- Includes set of 30 common Large Format Labels (page 83)
- Over 500 individual labels available (pages 84-87)

Main + 35 Positions



8382 3382

Main + 32 Positions



8381 3381

Main + 20 Positions



8379 3379

18 Position



8378 3378

24 Position



8264 3264

12 Position



8375 3375

Main + 22 Positions



8380 3380

13 Position



8679

13 Position



8403 3403

13 Position



8068 3068

16 Position



8377 3377

10 Position



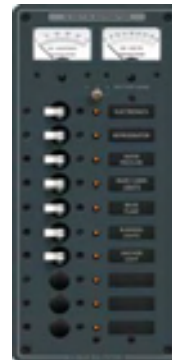
8680

10 Position



8402 3402

10 Position



8082 3082

13 Position



8376 3376

8 Position



8385 3385

6 Position



8677

6 Position



8096 3096

5 Position



8678

5 Position



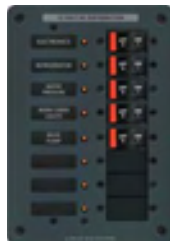
8401 3401

5 Position



8081 3081

8 Position



8676

8 Position



8023 3023

3 Position



8675

3 Position



8025 3025

A-Series Raised Rocker Circuit Breaker Panels

PN	Description	Meter Type/PN	Meter Page	Voltage	Amperage	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Single Pole Circuit Breakers
									15A
8675	3 Position	-	-	12/24V	100A	5.25 (133.35)	3.75 (95.25)	1.12 (0.61)	3
8678	5 Position	Digital/8248	90	12/24V	100A	5.25 (133.35)	7.50 (190.50)	3.45 (1.56)	5
8677	6 Position	-	-	12/24V	100A	10.50 (266.70)	3.75 (95.25)	2.20 (1.00)	6
8676	8 Position	-	-	12/24V	100A	5.25 (133.35)	7.50 (190.50)	1.84 (0.83)	5
8680	10 Position	Digital/8248	90	12/24V	100A	5.25 (133.35)	11.25 (285.75)	4.21 (1.92)	7
8679	13 Position	Digital/8248	90	12/24V	100A	10.50 (266.70)	7.50 (190.50)	5.15 (2.34)	10

A-Series Toggle Main Circuit Breaker Panels

PN	PN	Description	Meter Type/PN	Meter Page	Voltage	Amperage	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed C-Series Main Circuit Breakers	Installed Single Pole Circuit Breakers
										100A	15A
8379	3379	Main + 20 Positions	Digital/8248	90	12/24V	100A	14.75 (374.65)	7.50 (190.50)	8.40 (3.81)	1	14
8380	3380	Main + 22 Positions	Analog/8028, 8250	94	12V	100A	10.50 (266.70)	11.25 (285.75)	8.25 (3.74)	1	16
8381	3381	Main + 32 Positions	Analog/8003, 8017	94	12V	100A	14.75 (374.65)	11.25 (285.75)	8.60 (3.89)	1	23
8382	3382	Main + 35 Positions	Digital/8248	90	12/24V	100A	14.75 (374.65)	11.25 (285.75)	10.80 (4.92)	1	26

A-Series Toggle Branch Circuit Breaker Panels

PN	PN	Description	Meter Type/PN	Meter Page	Voltage	Amperage	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed C-Series Main Circuit Breakers	Installed Single Pole Circuit Breakers
										100A	15A
8025	3025	3 Position	-	-	12/24V	100A	5.25 (133.35)	3.75 (95.25)	1.15 (0.52)	-	3
8401	3401	5 Position	Digital/8248	90	12/24V	100A	5.25 (133.35)	7.50 (190.50)	3.45 (1.56)	-	5
8081	3081	5 Position	Analog/8028, 8041	94	12V	50A	5.25 (133.35)	7.50 (190.50)	2.25 (1.02)	-	5
8096	3096	6 Position	-	-	12/24V	100A	10.50 (266.70)	3.75 (95.25)	2.25 (1.02)	-	6
8023	3023	8 Position	-	-	12/24V	100A	5.25 (133.35)	7.50 (190.50)	1.95 (0.88)	-	5
8385	3385	8 Position	-	-	12/24V	100A	10.50 (266.70)	4.50 (114.30)	2.70 (1.22)	-	6
8402	3402	10 Position	Digital/8248	90	12/24V	100A	5.25 (133.35)	11.25 (285.75)	4.21 (1.91)	-	7
8082	3082	10 Position	Analog/8028, 8041	94	12V	50A	5.25 (133.35)	11.25 (285.75)	3.35 (1.52)	-	7
8375	3375	12 Position	-	-	12/24V	100A	14.75 (374.65)	4.50 (114.30)	5.84 (2.65)	-	10
8376	3376	13 Position	-	-	12/24V	100A	5.25 (133.35)	11.25 (285.75)	2.76 (1.25)	-	10
8403	3403	13 Position	Digital/8248	90	12/24V	100A	10.50 (266.70)	7.50 (190.50)	5.15 (2.34)	-	10
8068	3068	13 Position	Analog/8028, 8041	94	12V	50A	10.50 (266.70)	7.50 (190.50)	4.20 (1.91)	-	10
8377	3377	16 Position	-	-	12/24V	100A	10.50 (266.70)	7.50 (190.50)	3.68 (1.67)	-	10
8378	3378	18 Position	Analog/8003, 8017	94	12V	50A	14.75 (374.65)	7.50 (190.50)	7.80 (3.54)	-	15
8264	3264	24 Position	-	-	12/24V	100A	14.75 (374.65)	7.50 (190.50)	7.45 (3.38)	-	15

A-Series Toggle Circuit Breakers Single Pole

- Meets American Boat and Yacht Council (ABYC) standards
- UL 1077 recognized, TUV certified, CE marked for Europe, and CSA certified for Canada
- The industry standard circuit breaker for Blue Sea Systems' electrical panels
- Combines switching and circuit protection into a single device
- "Trip Free" design cannot be held "ON" during fault current condition

Specifications

Interrupt Rating	See Interrupt Rating table below
Maximum Voltage	277 Volts AC/65 Volts DC
Circuit Breaker Type	Magnetic Hydraulic - Trip free
Operating Temperature Range	-40°C to +85°C
Terminal Screw	#10-32 SS with external tooth lock washer - Recommended torque 14-15 in-lb
Trip Time Delay	See www.blueseasystems.com
Rated Switch Cycles	10,000@rated amperage and voltage
Mounting Screw	#6-32 - Recommended torque 6-8 in-lb
Weight	0.17Lb (0.08Kg)

Certifications

- CE marked, TUV certified, CSA certified

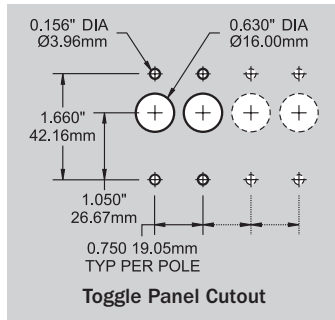
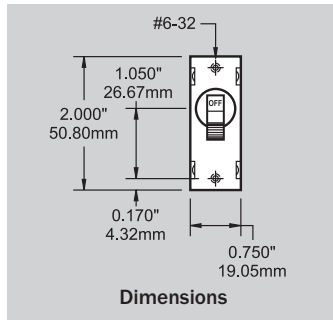
Agency Standards

- UL 1077 recognized

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 113)

A-Series Toggle Circuit Breakers - Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - TUV (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	5-50A	7,500A	1,500A
120V AC	5-50A	3,000A	1,500A
250V AC	5-50A	3,000A	1,500A

¹ UL Recognized



7200



7202

PN	Color	Amperage
7200	Black	5A
7201	Red	5A
7202	White	5A
7347	Black	8A
7299	White	8A
7204	Black	10A
7205	Red	10A
7206	White	10A
7208	Black	15A
7209	Red	15A
7210	White	15A
7212	Black	20A
7213	Red	20A
7214	White	20A
7216	Black	25A
7217	Red	25A
7218	White	25A
7220	Black	30A
7221	Red	30A
7222	White	30A
7224	Black	40A
7225	Red	40A
7226	White	40A
7228	Black	50A
7229	Red	50A
7230	White	50A

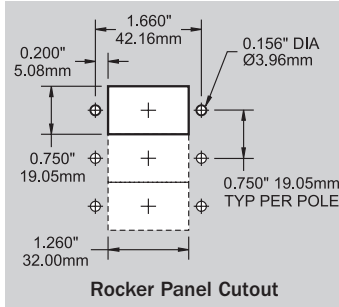
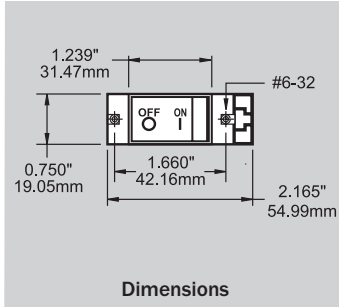
- ▶ For Double Pole A-Series Toggle Circuit Breakers, see page 50
- ▶ For A-Series Toggle Circuit Breaker Mounting Panels, see page 66



Photo: GRADY-WHITE EXPRESS 330 - Grady-White Boats, Inc.



7300



A-Series Raised Rocker Circuit Breakers Single Pole

- Rocker actuator offers modern appearance to electrical distribution panels
- Dual color rocker gives clear visual indication of handle position
- "Trip Free" design cannot be held "ON" during fault current condition
- International ON/OFF symbols

Specifications

Interrupt Rating See Interrupt Rating table to left
 Maximum Voltage See Interrupt Rating table to left
 Circuit Breaker Type Magnetic Hydraulic - Trip free
 Operating Temperature Range -40°C to +85°C
 Terminal Screw #10-32 SS with external tooth lock washer
 - Recommended torque 14-15 in-lb
 Trip Time Delay See www.blueseas.com
 Rated Switch Cycles 10,000@rated amperage and voltage
 Mounting Screw #6-32 SS - Recommended torque 6-8 in-lb
 Case Material Polyester
 Weight 0.20Lb (0.09Kg)

Certifications

- CE marked, VDE certified, CSA certified

Agency Standards

- UL 1077 recognized

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 113)

A-Series Raised Rocker Circuit Breakers - Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - VDE (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	5-50A	-	2,000A
80V DC	5-30A	-	4,000A
80V DC	5-50A	7,500A	-
125V AC	5-50A	3,000A	-
240V AC	5-50A	2,000A	-
250V AC	5-30A	2,000A	2,000A
250V AC	5-50A	-	2,000A

¹ UL Recognized

PN	Amperage
7300	5A
7301	8A
7302	10A
7303	15A
7304	20A
7305	25A
7306	30A
7307	40A
7308	50A

▶ For Double Pole A-Series Raised Rocker Circuit Breakers, see page 51

Flat

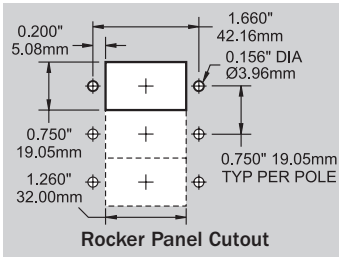
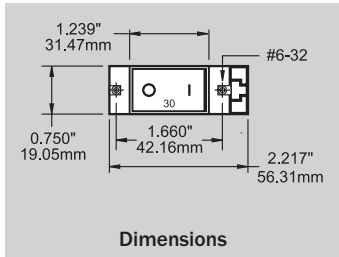


7408

Slot Reset



7433



A-Series Flat and Slot Reset Rocker Circuit Breakers Single Pole

- Color actuator indicates "OFF" position
- Rocker actuator is flush in the "ON" position, eliminating the risk of accidental switching
- "Trip Free" design cannot be held "ON" during fault current condition
- 2 different styles available to prevent accidental switching of 24 hour circuits
- International ON/OFF symbols support vertical or horizontal mounting

Specifications

Interrupt Rating See Interrupt Rating table to left
 Maximum Voltage See Interrupt Rating table to left
 Circuit Breaker Type Magnetic Hydraulic - Trip free
 Operating Temperature Range -40°C to +85°C
 Terminal Screw 45° Angled #10-32 x 5/16 SS SEM external tooth lock washer
 - Recommended torque 14-15 in-lb
 Trip Time Delay See www.blueseas.com
 Rated Switch Cycles 10,000@rated amperage and voltage
 Mounting Screw #6-32 SS - Recommended torque 6-8 in-lb
 Weight 0.16Lb (0.07Kg)

Certifications

- CE marked, VDE certified, CSA certified

Agency Standards

- UL 1077 recognized

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 113)

A-Series Flat and Slot Reset Rocker Circuit Breakers - Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - VDE (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	5-50A	-	2,000A
80V DC	5-30A	-	4,000A
80V DC	5-50A	7,500A	-
125V AC	5-50A	3,000A	-
240V AC	5-50A	2,000A	-
250V AC	5-30A	2,000A	2,000A
250V AC	5-50A	-	2,000A

¹ UL Recognized

PN	Actuator	Poles	Amperage
7400	Flat	1	5A
7401	Flat	1	8A
7402	Flat	1	10A
7403	Flat	1	15A
7404	Flat	1	20A
7405	Flat	1	25A
7406	Flat	1	30A
7407	Flat	1	40A
7408	Flat	1	50A

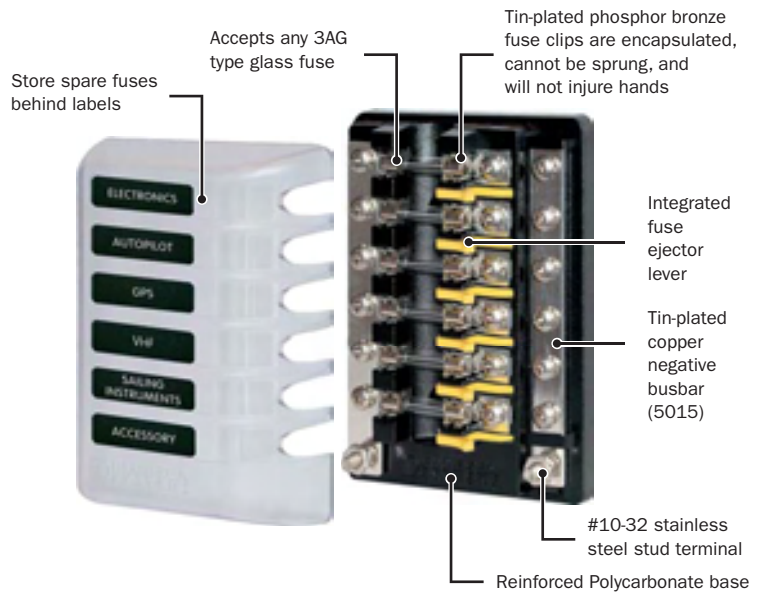
PN	Actuator	Poles	Amperage
7425	Slot Reset	1	5A
7426	Slot Reset	1	8A
7427	Slot Reset	1	10A
7428	Slot Reset	1	15A
7429	Slot Reset	1	20A
7430	Slot Reset	1	25A
7431	Slot Reset	1	30A
7432	Slot Reset	1	40A
7433	Slot Reset	1	50A

ST Glass Fuse Blocks (Screw Terminal)

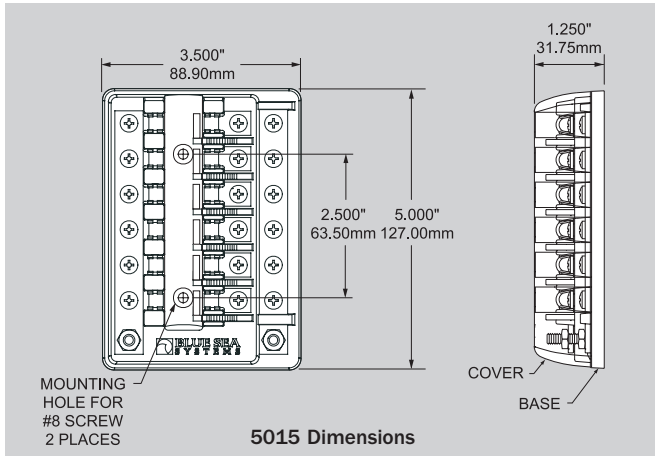
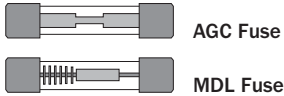
- Clear insulating cover with label recesses accepts Large Format Labels (pages 83-87)
- Cover satisfies ABYC/USCG insulation requirements
- Tin-plated copper buses and phosphor bronze fuse clips give 30 Amperes rating per circuit
- Accepts AGC (Fast Acting), MDL (Time-Delay) and all other 3AG Glass Fuses

Specifications

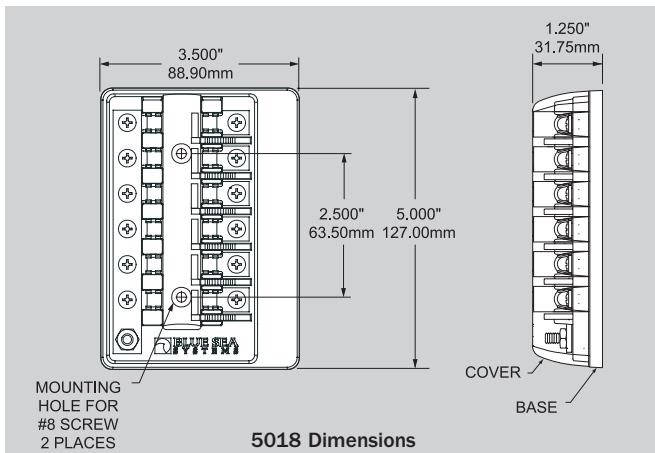
Maximum Voltage	32 Volts DC
Maximum Amperage per circuit	30 Amperes DC
Maximum Amperage per block	100 Amperes DC
Fuse Type	AGC/MDL Fuses
Fuse Rating	1/8 to 30 Amperes DC
Screw Terminal	#8-32 with Captive Star Lockwasher
Base Material	Reinforced Polycarbonate
Cover Material	Polycarbonate



PN	Description	Weight Lb (Kg)
5015	6 circuit with negative bus	0.55 (0.25)
5018	6 circuit	0.48 (0.22)

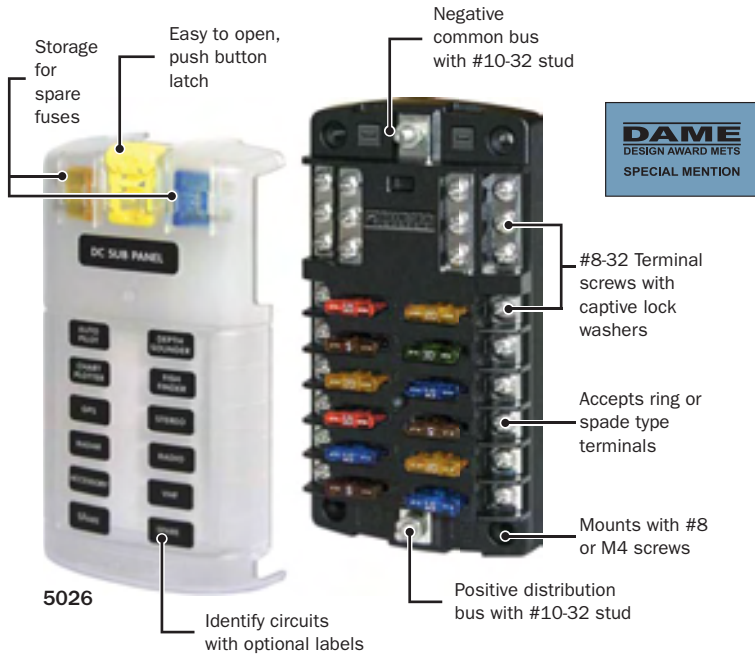


6 Circuit with Negative Bus



6 Circuit





ST Blade Fuse Blocks (Screw Terminal)

- Clear insulating cover with label recesses accepts Small Format Labels (page 83)
- Cover satisfies ABYC/USCG insulation requirements
- Tin-plated copper buses and fuse clips give 30 Amperes rating per circuit
- Accepts ATO and ATC fast acting blade fuses (page 47)
- ST Blade Fuse Blocks with covers include 20 write-on circuit labels

Specifications

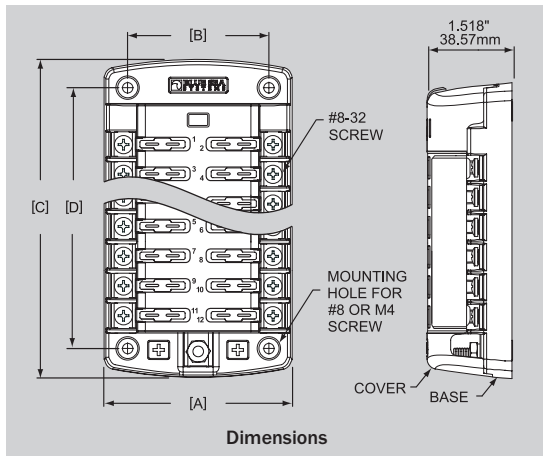
Maximum Voltage	32 Volts DC
Maximum Amperage per circuit	30 Amperes DC
Maximum Amperage per block	100 Amperes DC
Fuse Type	ATO/ATC Fuses
Fuse Rating	1 to 30 Amperes DC
Screw Terminal	#8-32 Screws with Captive Star Lockwasher
Base Material	Reinforced Polycarbonate
Cover Material	Polycarbonate

ST Blade Fuse Block With Cover		
PN	Description	Weight Lb (Kg)
5025	6 circuit with negative bus	0.55 (0.25)
5026	12 circuit with negative bus	0.75 (0.34)
5028	6 circuit	0.42 (0.19)
5029	12 circuit	0.68 (0.31)

ST Blade Fuse Block Without Cover		
PN	Description	Weight Lb (Kg)
5030	6 circuit with negative bus	0.47 (0.21)
5031	12 circuit with negative bus	0.65 (0.29)
5033	6 circuit	0.42 (0.19)
5034	12 circuit	0.59 (0.27)



▶ See page 47 for ATO/ATC Fuses.



PN	[A] Width in" (mm)	[B] Mounting Centers in" (mm)	[C] Height in" (mm)	[D] Mounting Centers in" (mm)
5028/5033	3.315 (84.20)	2.500 (63.50)	3.652 (92.76)	2.639 (67.03)
5025/5030	3.315 (84.20)	2.500 (63.50)	4.894 (124.31)	3.881 (99.58)
5029/5034	3.315 (84.20)	2.500 (63.50)	5.230 (132.84)	4.217 (107.11)
5026/5031	3.315 (84.20)	2.500 (63.50)	6.472 (164.39)	5.459 (138.66)

MAXI™ Fuse Block

- The most economical fuse block for 30-80 Ampere fusing
- Snap-on terminal cover insulates all conductive parts, satisfying ABYC/USCG requirements
- Accepts wire sizes 18-4 AWG from sides or bottom
- For use on systems up to 32 Volts DC
- Terminal screws compress fuse blades within blocks for low resistance connections
- Accepts Maxi™ Fuses

Specifications

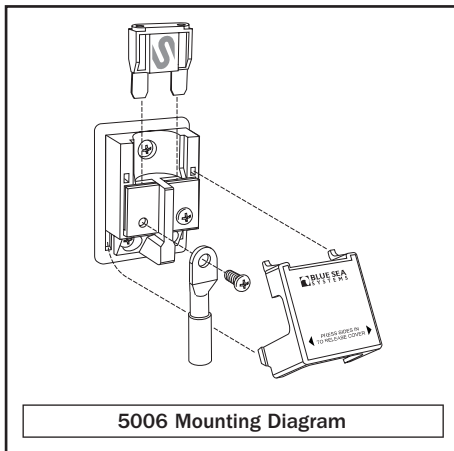
Maximum Voltage	32 Volts DC
Maximum Amperage	80 Amperes
Fuse Type	MAXI™ Fuses
Fuse Rating	30-80 Amperes
Base Material	Reinforced Polycarbonate

PN	Description	Weight Lb (Kg)
5006	30-80A	0.25 (0.11)

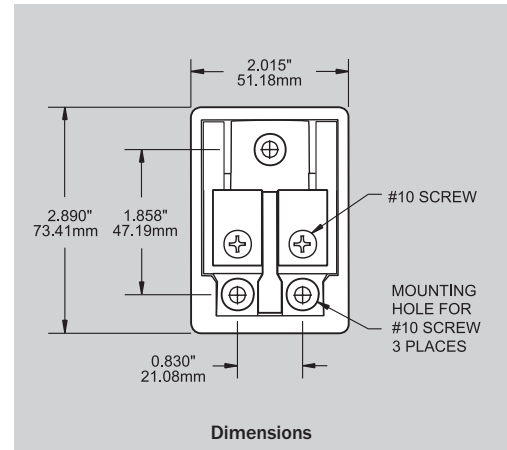
▶ See page 47 for MAXI™ Fuses.



5006



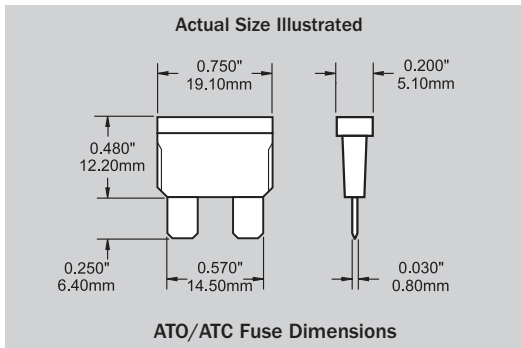
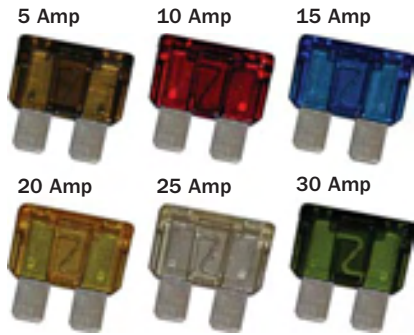
5006 Mounting Diagram



Dimensions



Photo: Hunt Yachts, Inc.



ATO/ATC Fuses

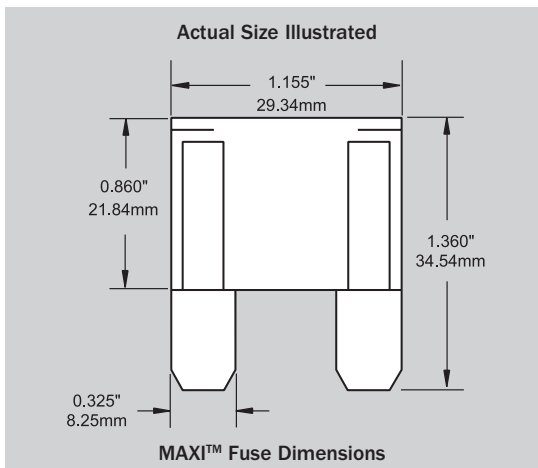
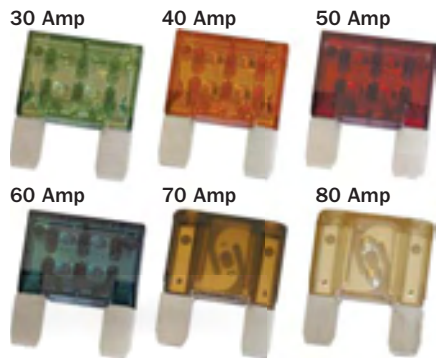
- Fast-acting type fuses ideal for electronic devices
- Standard circuit protection device for automobiles and trucks
- Tin-plated connector blades for corrosion resistance
- Visible indication of blown condition
- Sold in packages of 2

Specifications

Interrupt Rating 1,000 Amperes DC
 Maximum Voltage 32 Volts DC
 Blow Time Delay See www.blueseas.com
 Weight per package 0.03Lb (0.01Kg)

PN	Amperage
5235	1A
5236	2A
5237	3A
5238	4A
5239	5A
5240	7.5A
5241	10A
5242	15A
5243	20A
5244	25A
5245	30A

- ▶ See page 45 for ST Blade Fuse Blocks (Screw Terminal)
- ▶ See pages 36-37 for WeatherDeck™ Waterproof Fuse Panels



MAXI™ Fuses

- Economical
- Tin-plated connector blades for corrosion resistance
- Visible indication of blown condition
- Sold in packages of 2

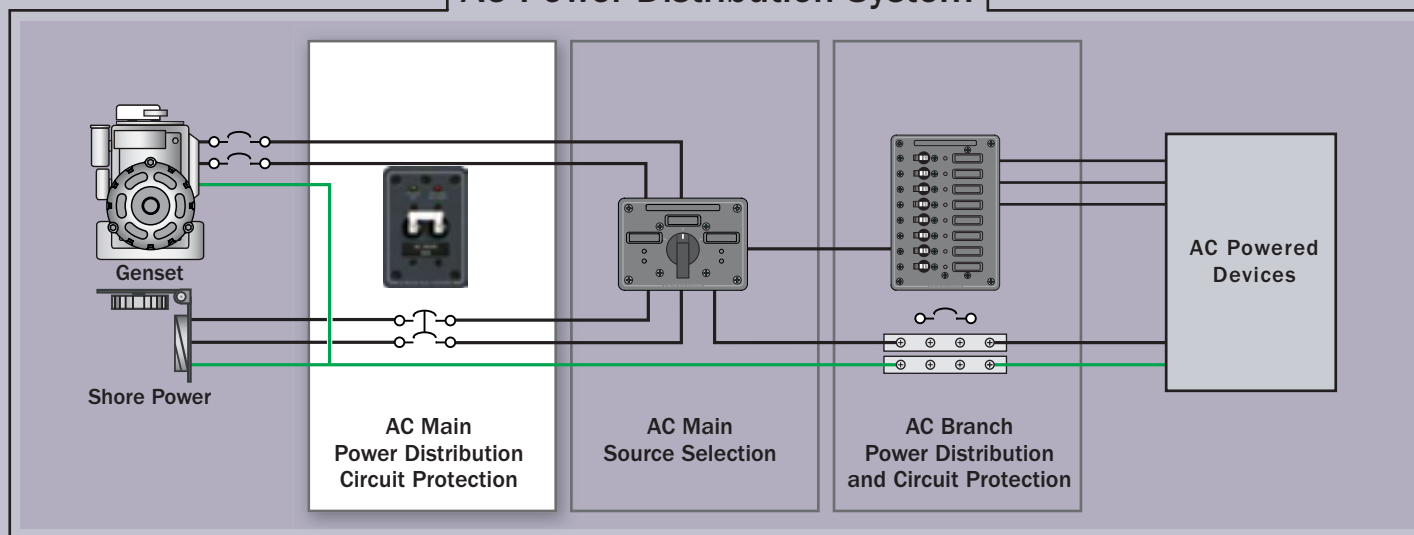
Specifications

Interrupt Rating 1,000 Amperes DC
 Maximum Voltage 32 Volts DC
 Blow Time Delay See www.blueseas.com
 Weight per package 0.04Lb (0.02Kg)

PN	Amperage
5138	30A
5139	40A
5140	50A
5141	60A
5142	70A
5143	80A

- ▶ See page 46 for MAXI™ Fuse Block.

AC Power Distribution System



AC Main Power Distribution and Circuit Protection

Definition

The AC Main power system begins at the AC power sources (shore power, genset, or inverter), and ends at the line terminal connection of the AC branch circuit breaker for the hot wire, and at the branch circuit connection block for the neutral and safety ground wires.

Purpose

AC Main power distribution provides a path for delivering power from the ship's source of AC power to the AC branch distribution system. The devices used to distribute AC power are frequently the same as the devices that provide AC circuit protection. Sources of AC power, whether shore power or on-board generators and inverters, always have a circuit breaker near the power source. It is designated the AC main circuit breaker.

Considerations

In order to qualify as an AC main circuit breaker, four requirements must be met:

- The circuit breaker must have a suitable AIC rating
- The circuit breaker must be multiple pole, usually double or triple
- The circuit breaker must be rated for the appropriate AC system voltage in which it will be used
- The circuit breaker must be available in amperages appropriate to the design amperage of the system

Products in this Section

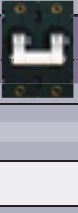



Circuit Breakers: Circuit breakers used for AC Main circuit protection are double and triple pole, they are available in rocker and toggle models, and range in continuous current ratings from 10 to 100A. Circuit breaker mounting panels are available.

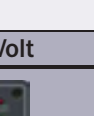


Power Distribution and Circuit Protection Panels: Blue Sea Systems' AC Main power distribution panels are available in a variety of configurations. There are Main Only panels in 120V, 120/240V, and 230V (typical of Europe) ratings. There are C-Series Toggle circuit breaker panels available in 120/240V ratings, and A-Series Toggle and A-Series Rocker available in 120V and 230V (Typical of Europe) ratings. Panels are available with and without meters, with and without main circuit breakers, and from 1 to 34 positions.


For more information about AC Main Power Distribution and Circuit Protection, refer to pages 115-116 in this catalog.


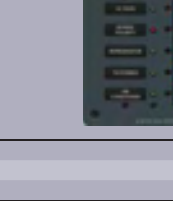
Blue Sea Systems uses circuit breakers manufactured by Carling Technologies®, Airpax®, and Cooper Bussmann®.


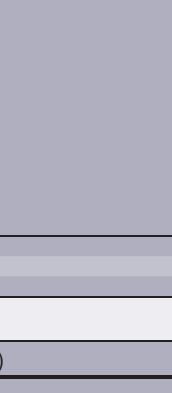


Double Pole Circuit Breakers and Mounting Panels Pages 50-52			
Current Rating (Amperes)	A-Series Toggle 10-50 Amperes	A-Series Raised Rocker 10-50 Amperes	C-Series Toggle 30-100 Amperes
			
			

Main Only Circuit Breaker Panels Pages 53		
120 Volt	120/240 Volt	230 Volt (Typical of Europe)
		

120/240 Volt Circuit Breaker Panels Pages 53
120/240 Volt


A-Series Main Raised Rocker Circuit Breaker Panels Pages 54-55	
120 Volt	230 Volt (Typical of Europe)
	

A-Series Main Toggle Circuit Breaker Panels Pages 54-55	
120 Volt	230 Volt (Typical of Europe)
	

A-Series Toggle Circuit Breakers Double Pole

- Meets American Boat and Yacht Council (ABYC) standards
- UL 1077 recognized, TUV certified, CE marked for Europe, and CSA certified for Canada
- The industry standard circuit breaker for Blue Sea Systems electrical panels
- Combines switching and circuit protection into a single device
- Used as AC main circuit protection
- "Trip Free" design cannot be held "ON" during fault current condition
- For circuit breaker mounting panel (see below)

Specifications

Interrupt Rating	See Interrupt Rating table below
Maximum Voltage	277 Volts AC/65 Volts DC
Circuit Breaker Type	Magnetic Hydraulic - Trip free
Operating Temperature Range	-40°C to +85°C
Terminal Screw	#10-32 SS with external tooth lockwasher - Recommended torque 14-15 in-lb
Trip Time Delay	See www.blueseas.com
Rated Switch Cycles	10,000 @ rated amperage and voltage
Mounting Screw	#6-32 SS - Recommended torque 6-8 in-lb
Weight	0.30Lb (0.14Kg)

Certifications

- CE marked, TUV certified, CSA certified

Agency Standards

- UL 1077 recognized

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 118)

A-Series Toggle Circuit Breakers - Double Pole			
Voltage	Current	Interrupt Ratings	Interrupt Ratings
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - TUV (Europe)
65V DC	10-50A	7,500A	1,500A
120V AC	10-50A	3,000A	1,500A
120/240V AC	10-50A	3,000A	1,500A
250V AC	10-50A	3,000A	1,500A

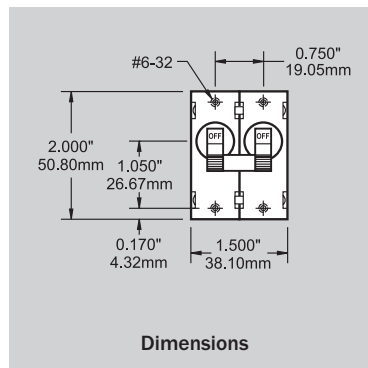
¹ UL Recognized

PN	Color	Amperage
7232	Black	10A
7233	White	10A
7234	Black	15A
7235	White	15A
7348	Black	16A
7294	White	16A
7236	Black	20A
7260	White	20A

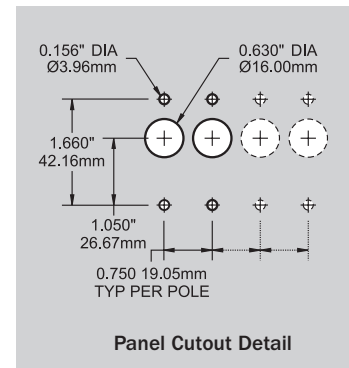
PN	Color	Amperage
7237	Black	30A
7238	White	30A
7349	Black	32A
7295	White	32A
7239	Black	40A
7240	White	40A
7241	Black	50A
7242	White	50A



7233



Dimensions



Panel Cutout Detail

A-Series Toggle Circuit Breaker Mounting Panel Double Pole

- Mounts A-Series Double Pole Toggle Circuit Breakers (see above)
- Slate gray matches standard panel color

Specifications

Panel Material:	Heavy 1/8" aluminum 5052 alloy
Primary Finish:	Mil-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
Final Panel Finish:	2-part polyurethane slate gray finish
Dimensions	2.63" (66.80mm) x 3.75" (95.25mm)

PN	Description	Weight Lb (Kg)
8173	Mounting Panel - Double Pole	0.08 (0.04)



8173



7320

A-Series Raised Rocker Circuit Breakers Double Pole

- Rocker actuator gives modern appearance to electrical distribution panels
- UL 1077 recognized, VDE certified, CE marked for Europe, and CSA certified for Canada
- Dual color rocker gives clear visual indication of handle position
- Used as AC main circuit protection
- "Trip Free" design cannot be held "ON" during fault current condition

Specifications

Interrupt Rating	See Interrupt Rating table below
Maximum Voltage	See Interrupt Rating table below
Circuit Breaker Type	Magnetic Hydraulic - Trip free
Operating Temperature Range	-40°C to +85°C
Terminal Screw	#10-32 SS with external tooth lockwasher -Recommended torque 14-15 in-lb
Trip Time Delay	See www.bluesea.com
Rated Switch Cycles	10,000@rated amperage and voltage
Mounting Screw	#6-32 SS - Recommended torque 6-8 in-lb

Certifications

- CE marked, VDE certified, CSA certified

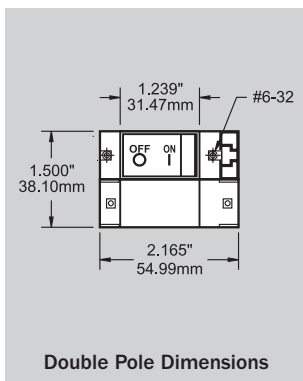
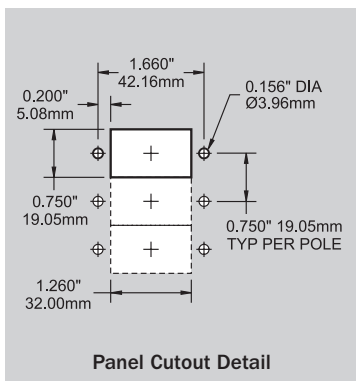
Agency Standards

- UL 1077 recognized

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 118)

A-Series Raised Rocker Circuit Breakers - Double Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - VDE (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	10-50A	-	2,000A
80V DC	10-30A	-	4,000A
80V DC	10-50A	7,500A	-
125V AC	10-50A	3,000A	-
240V AC	10-50A	2,000A	-
250V AC	10-30A	2,000A	2,000A
250V AC	10-50A	-	2,000A

¹ UL Recognized



PN	Poles	Amperage	Weight Lb (Kg)
7320	2	10A	0.38 (0.17)
7321	2	15A	0.38 (0.17)
7322	2	16A	0.38 (0.17)
7323	2	20A	0.38 (0.17)
7324	2	30A	0.38 (0.17)
7325	2	32A	0.38 (0.17)
7326	2	40A	0.38 (0.17)
7327	2	50A	0.38 (0.17)
4110	Panel Plug Kit		



Photo: RAMPAGE 33 EXPRESS - Rampage Sport Fishing Yachts

C-Series Toggle Circuit Breakers Double and Triple Pole

- 5,000 Ampere interrupt capacity to meet ABYC requirements for 120/240 Volt 50 Ampere main protection
- Double pole can be used as 120 Volt AC main circuit breaker to switch hot and neutral
- Triple pole can be used as 240 Volt AC main circuit breaker to switch both lines (hots) and neutral
- Double and triple pole circuit breakers will trip all poles if any one pole trips
- "Trip Free" design cannot be held "ON" during fault current condition

Specifications

Interrupt Rating	See Interrupt Rating table to right
Maximum Voltage	250 Volts AC
Maximum Amperage	100 Amperes AC
Circuit Breaker Type	Magnetic
Terminal Studs	1/4"-20 SS - Maximum torque 35 in-lb
Operating Temperature Range	-40°C to +85°C
Mounting Screw	#6-32 SS - Recommended torque 6-8 in-lb
Trip Time Delay	See www.blueseasystems.com

Certifications

- VDE certified, CSA certified

Agency Standards

- UL 1077 recognized



7251



7287

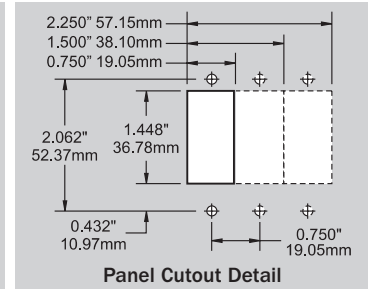
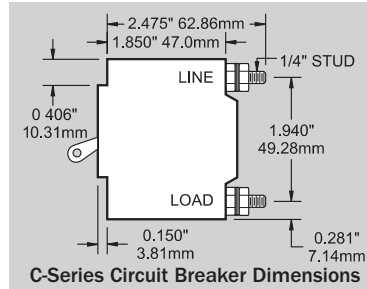
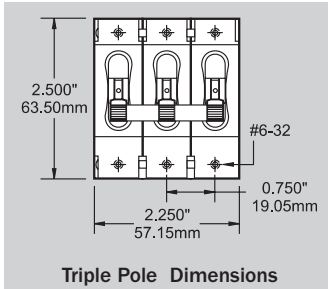
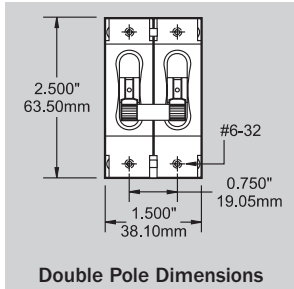
PN	Color	Poles	Amperage	Weight Lb (Kg)
7365	White	2	30A	0.60 (0.27)
7251	White	2	50A	0.60 (0.27)
7254	White	2	60A	0.60 (0.27)
7256	White	2	80A	0.60 (0.27)
7258	White	2	100A	0.60 (0.27)
7287	White	3	50A	0.90 (0.41)
7288	White	3	60A	0.90 (0.41)
7289	White	3	80A	0.90 (0.41)
7290	White	3	100A	0.90 (0.41)

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 118)

C-Series Toggle Circuit Breakers - Double and Triple Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - TUV (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
125/250V AC	30-100A	5,000A	5,000A
250V AC	30-100A	5,000A	5,000A

¹ UL Recognized

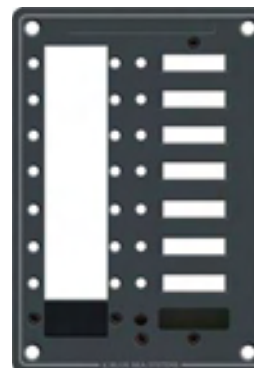
► See page 26 for single pole C-Series Toggle Circuit Breakers.



C-Series Toggle Circuit Breaker Mounting Panels

- Designed for C-Series Toggle Circuit Breakers (see above and page 26)
- Heavy 1/8" aluminum 5052 alloy
- Two-part polyurethane slate gray finish
- Accepts standard Blue Sea Systems backlightable labels (pages 85-89)
- Accepts standard Blue Sea Systems "ON" indicating LEDs (page 81)
- Industry standard height and width
- Panel Plug Kit included
- Panel plugs can be inserted to fill blank positions
- Panel Plug Kit 8089 includes Circuit Breaker Mounting Screws, panel plug, LED plug, and blank label

PN	Description	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)
8087	8 Position	5.25 (133.35)	7.50 (190.50)	0.40 (0.18)
8088	3 Position	5.25 (133.35)	3.75 (95.25)	0.24 (0.11)
8089	Panel Plug Kit	-	-	0.10 (0.04)



8087



8088

Toggle style panels available with white or black circuit breakers installed.



AC Main Only Circuit Breaker Panels

- Red reverse polarity indicating LED
- Safety ground screw on panel back
- Combines switching and circuit protection into a single device
- Raised rocker actuator gives modern appearance to electrical distribution panels (8604, 8605, 8606, and 8607)
- Raised rocker gives clear visual indication of handle position (8604, 8605, 8606, and 8607)
- “Trip Free” design cannot be held “ON” during fault current condition

Specifications

Ratings: 65 Volts DC/277 Volts AC Maximum
 Circuit Breaker Type: Magnetic Hydraulic - Trip free
 Trip Time Delay: See www.blueseas.com
 Panel Material: Heavy 1/8" aluminum 5052 alloy
 Primary Finish: Mil-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
 Final Panel Finish: 2-part polyurethane slate gray finish
 Toggle Circuit Breaker: Double Pole AC A-Series Toggle Circuit Breaker (page 50)
 Rocker Circuit Breaker: Double Pole AC A-Series Raised Rocker Circuit Breaker (page 51)

Certifications

- CE marked

Main Only



8077/8079/8177*/8179*
 3077/3079/3177*/3179*

Main Only



8604/8605/8606*/8607*

AC Main Only A-Series Toggle Circuit Breaker Panels										
PN	PN	Description	Voltage	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers			
							16A	30A	32A	50A
8077	3077	Main Only	120 Volt	2.63 (66.80)	3.75 (95.25)	0.51 (0.23)	-	1	-	-
8079	3079	Main Only	120 Volt	2.63 (66.80)	3.75 (95.25)	0.51 (0.23)	-	-	-	1
8177	3177	Main Only	230 Volt (Typical of Europe)	2.63 (66.80)	3.75 (95.25)	0.51 (0.23)	1	-	-	-
8179	3179	Main Only	230 Volt (Typical of Europe)	2.63 (66.80)	3.75 (95.25)	0.51 (0.23)	-	-	1	-

AC Main Only A-Series Raised Rocker Circuit Breaker Panels										
PN	Description	Voltage	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers				
						16A	30A	32A	50A	
8604	Main Only	120 Volt	3.75 (95.25)	2.63 (66.80)	0.51 (0.23)	-	1	-	-	
8605	Main Only	120 Volt	3.75 (95.25)	2.63 (66.80)	0.51 (0.23)	-	-	-	1	
8606	Main Only	230 Volt (Typical of Europe)	3.75 (95.25)	2.63 (66.80)	0.51 (0.23)	1	-	-	-	
8607	Main Only	230 Volt (Typical of Europe)	3.75 (95.25)	2.63 (66.80)	0.51 (0.23)	-	-	1	-	

See page 54-55, 58-59, 68-69, 72-73 For full selection of AC Circuit Breaker Panels.
 * 230 Volt (typical for European applications)

Main Only



7372

120/240 Volt AC C-Series Toggle Circuit Breaker Panels

- Red reverse polarity indicating LED
- All neutral and safety ground buses installed
- Label backlighting pre-installed
- All LEDs installed
- Extra positions available for double pole A-Series Toggle Circuit Breakers (page 52)
- Maximum panel amperage - 50 Amperes

Main + 3 Positions



7370

Main + 3 Positions



7371

120/240 VOLT AC Main C-Series Toggle Circuit Breaker Panels							
PN	Description	Meter Type PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed C-Series Toggle 3 Pole Main
							50A
7370	Main + 3 Positions	Analog 9354	95	5.25 (133.35)	11.25 (285.75)	2.98 (1.35)	1
7371	Main + 3 Positions	Digital 8247	92	5.25 (133.35)	11.25 (285.75)	3.37 (1.53)	1
7372	Main Only	-	-	5.25 (133.35)	3.75 (95.25)	1.38 (0.63)	1

Blue Sea Systems' recommends using double pole circuit breakers to fill the open positions.

AC Main A-Series Circuit Breaker Panels

▶ Toggle style panels available with white or black circuit breakers installed.

Common Features

- Red reverse polarity indication LED
- All hot, neutral, and safety ground buses installed, fully pre-wired
- All circuit label positions are backlit on standard panels - No kit required
- "ON" indicating LEDs installed in all circuit positions
- MIL-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Industry standard height and width
- Countersunk mounting holes throughout
- Detailed installation instructions and cutout template included
- Includes set of 30 common Large Format Labels (page 83)
- Over 500 individual labels available (pages 84-87)
- Maximum panel amperage - 50 Amperes

Main + 31 Positions



8486/8586* 3486/3586*

Main + 22 Positions



8465/8565* 3465/3565*

Main + 11 Positions



8407/8507* 3407/3507*

Main + 6 Positions



8412/8512* 3412/3512*

Main + 11 Positions



8076/8176* 3076/3176*

Main + 16 Positions



8471/8571* 3471/3571*

Main + 4 Positions



8099/8199* 3099/3199*

Main + 14 Positions



8464/8564* 3464/3564*

Main + 8 Positions



8620/8621*

Main + 8 Positions



8406/8506* 3406/3506*

Main + 8 Positions



8488/8588* 3488/3588*

Main + 8 Positions



8074/8174* 3074/3174*

Main + 11 Positions



8485/3485* 8585/3585*

Main + 1 Positions¹



8614/8615*

Main + 3 Positions



8618/8619*

Main + 3 Positions



8405/8505* 3405/3505*

Main + 3 Positions



8043/8143* 3043/3143*

Main + 3 Positions



8409/8509* 3409/3509*

Main + 6 Positions



8616/8617*

Main + 6 Positions



8027/8127* 3027/3127*

Main + 1 Positions¹



8029/8129* 3029/3129*

¹ Includes labels illustrated only
* 230 Volt (typical of Europe)

Use the tables below to select AC Distribution Panels with AC Main Circuit Breakers where a single AC electrical source is brought to the panel and AC Main Circuit Protection is desired.

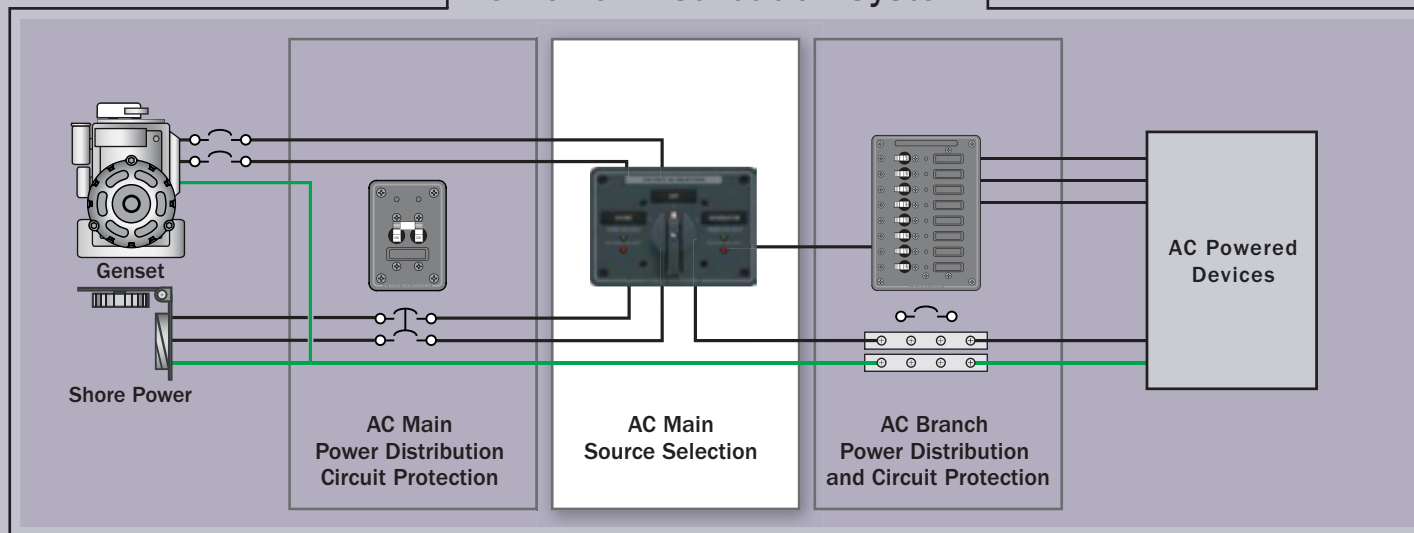
120 VOLT Main A-Series Raised Rocker Circuit Breaker Panels												
PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breaker			Installed Single Pole Circuit Breakers		
							16A	30A	32A	50A	8A	15A
8614	Main + 1 Position ¹	-	-	5.25 (133.35)	3.75 (95.25)	0.95 (0.43)	-	1	-	-	-	-
8618	Main + 3 Positions	Digital/8247	92	5.25 (133.35)	7.50 (190.50)	2.48 (1.12)	-	1	-	-	-	3
8616	Main + 6 Positions	-	-	5.25 (133.35)	7.50 (190.50)	1.87 (0.85)	-	1	-	-	-	3
8620	Main + 8 Positions	Digital/8247	92	5.25 (133.35)	11.25 (285.75)	3.20 (1.45)	-	1	-	-	-	5

230 VOLT Main A-Series Raised Rocker Circuit Breaker Panels (Typical of Europe)												
PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breaker			Installed Single Pole Circuit Breakers		
							16A	30A	32A	50A	8A	15A
8615	Main + 1 Position ¹	-	-	5.25 (133.35)	3.75 (95.25)	0.95 (0.43)	1	-	-	-	-	-
8619	Main + 3 Positions	Digital/8247	92	5.25 (133.35)	7.50 (190.50)	2.48 (1.12)	1	-	-	-	3	-
8617	Main + 6 Positions	-	-	5.25 (133.35)	7.50 (190.50)	1.87 (0.85)	1	-	-	-	3	-
8621	Main + 8 Positions	Digital/8247	92	5.25 (133.35)	11.25 (285.75)	3.20 (1.45)	1	-	-	-	5	-

120 VOLT Main A-Series Toggle Circuit Breaker Panels										
PN	PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers		Installed Single Pole Circuit Breakers
								30A	50A	15A
8029	3029	Main + 1 Position	-	-	5.25 (133.35)	3.75 (95.25)	1.05 (0.48)	1	-	-
8043	3043	Main + 3 Positions	Analog/9353	95	5.25 (133.35)	7.50 (190.50)	2.00 (0.91)	1	-	3
8409	3409	Main + 3 Positions	Analog/8246, 8244	95	5.25 (133.35)	7.50 (190.50)	4.06 (1.84)	1	-	3
8405	3405	Main + 3 Positions	Digital/8247	92	5.25 (133.35)	7.50 (190.50)	2.94 (1.33)	1	-	3
8099	3099	Main + 4 Positions	-	-	10.50 (266.70)	3.75 (95.25)	2.22 (1.00)	1	-	4
8027	3027	Main + 6 Positions	-	-	5.25 (133.35)	7.50 (190.50)	2.00 (0.91)	1	-	3
8412	3412	Main + 6 Positions	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	1	-	4
8488	3488	Main + 8 Positions	Analog/9353	95	5.25 (133.35)	11.25 (285.75)	3.00 (1.36)	1	-	5
8074	3074	Main + 8 Positions	Analog/8246, 8244	95	5.25 (133.35)	11.25 (285.75)	3.28 (1.49)	1	-	5
8406	3406	Main + 8 Positions	Digital/8247	92	5.25 (133.35)	11.25 (285.75)	3.18 (1.44)	1	-	5
8076	3076	Main + 11 Positions	Analog/8246, 8244	95	10.50 (266.70)	7.50 (190.50)	4.24 (1.92)	1	-	8
8407	3407	Main + 11 Positions	Digital/8247	92	10.50 (266.70)	7.50 (190.50)	4.78 (2.17)	1	-	8
8485	3485	Main + 11 Positions	-	-	5.25 (133.35)	11.25 (285.75)	2.81 (1.27)	1	-	8
8464	3464	Main + 14 Positions	-	-	10.50 (266.70)	7.50 (190.50)	3.74 (1.70)	1	-	8
8471	3471	Main + 16 Positions	Analog/9630, 9353	95	14.75 (374.65)	7.50 (190.50)	5.96 (2.70)	1	-	13
8465	3465	Main + 22 Positions	-	-	14.75 (374.65)	7.50 (190.50)	5.25 (2.38)	1	-	13
8486	3486	Main + 31 Positions	Analog/9630, 9353	95	14.75 (374.65)	11.25 (285.75)	8.94 (4.05)	1	-	22

230 VOLT Main A-Series Toggle Circuit Breaker Panels (Typical of Europe)										
PN	PN	Description	Meter/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers		Installed Single Pole Circuit Breaker
								16A	32A	8A
8129	3129	Main + 1 Position	-	-	5.25 (133.35)	3.75 (95.25)	1.05 (0.48)	1	-	-
8143	3143	Main + 3 Positions	Analog/9354	95	5.25 (133.35)	7.50 (190.50)	2.00 (0.91)	1	-	3
8509	3509	Main + 3 Positions	Analog/8246, 8245	95	5.25 (133.35)	7.50 (190.50)	4.06 (1.84)	1	-	3
8505	3505	Main + 3 Positions	Digital/8247	92	5.25 (133.35)	7.50 (190.50)	2.94 (1.33)	1	-	3
8199	3199	Main + 4 Positions	-	-	10.50 (266.70)	3.75 (95.25)	2.22 (1.00)	1	-	4
8127	3127	Main + 6 Positions	-	-	5.25 (133.35)	7.50 (190.50)	2.00 (0.91)	1	-	3
8512	3512	Main + 6 Positions	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	1	-	4
8588	3588	Main + 8 Positions	Analog/9354	95	5.25 (133.35)	11.25 (285.75)	3.00 (1.36)	1	-	5
8174	3174	Main + 8 Positions	Analog/8246, 8245	95	5.25 (133.35)	11.25 (285.75)	3.28 (1.49)	1	-	5
8506	3506	Main + 8 Positions	Digital/8247	92	5.25 (133.35)	11.25 (285.75)	3.18 (1.44)	1	-	5
8176	3176	Main + 11 Positions	Analog/8246, 8245	95	10.50 (266.70)	7.50 (190.50)	4.24 (1.92)	1	-	8
8507	3507	Main + 11 Positions	Digital/8247	92	10.50 (266.70)	7.50 (190.50)	4.78 (2.17)	1	-	8
8585	3585	Main + 11 Positions	-	-	5.25 (133.35)	11.25 (285.75)	2.81 (1.27)	1	-	8
8564	3564	Main + 14 Positions	-	-	10.50 (266.70)	7.50 (190.50)	3.74 (1.70)	1	-	8
8571	3571	Main + 16 Positions	Analog/9630, 9354	95	14.75 (374.65)	7.50 (190.50)	5.96 (2.70)	1	-	13
8565	3565	Main + 22 Positions	-	-	14.75 (374.65)	7.50 (190.50)	5.25 (2.38)	1	-	13
8586	3586	Main + 31 Positions	Analog/9630, 9354	95	14.75 (374.65)	11.25 (285.75)	8.94 (4.05)	1	-	22

AC Power Distribution System



AC Main Source Selection

Definition

Source selection devices select between two or more sources of AC power and allow only one AC source to be connected at a time.

Purpose

AC sources from shore power, gensets, inverters, and isolation transformers must be switched in such a way that ensures only one AC source is connected and all other AC sources are completely disconnected. A properly designed selector system will allow only the appropriate neutral and hot source conductors to connect to the load without allowing the system to supply power backwards to unused connections or sources.

Products in this Section

In marine AC systems, there are two common methods used to switch AC sources—circuit breaker panels with lockout slides and rotary switches. AC Lockout Slides are devices that slide between circuit breaker handles and allow only one handle to be in the ON position, allowing only one source of AC power at a time. AC Rotary Switches use a switching mechanism to prevent connection of different sources at the same time.

Circuit Breaker Panels: Blue Sea Systems' AC Main source selection panels are available for 120V, 120/240V, and 230V (typical of Europe) ratings, with toggle and rocker-style circuit breakers. They are available with and without meters, switch 2 and 3 sources, and have from 2 to 32 positions. Often, AC Main circuit protection, source selection, and branch circuit protection are combined in one panel.



Rotary Switch Panels: Blue Sea Systems' AC Main source selection rotary switches are available in 120V, 120/240V, and 230V (typical of Europe) ratings.

For more information about AC main source selection, refer to pages 117 in this catalog.


A-Series Source Selection Raised Rocker Circuit Breaker Panels Pages 58-59

120 Volt	230 Volt (Typical of Europe)
	




A-Series Source Selection Toggle Circuit Breaker Panels Pages 58-59

120 Volt	230 Volt (Typical of Europe)
	

120/240 Volt Source Selection Toggle Circuit Breaker Panels Pages 60

120/240 Volt	
	

Source Selection Rotary Switches and Panels Pages 61-63

120 Volt	120/240 Volt	230 Volt (Typical of Europe)
		

A-Series Source Selection Circuit Breaker Panels

Common Features

- Double pole AC main circuit breakers with installed lockout slides
- Prevent connecting multiple AC sources simultaneously
- Red reverse polarity indication LED
- All hot, neutral, and safety ground buses installed, fully pre-wired
- All circuit label positions are backlit on standard panels - No kit required
- "ON" indicating LEDs installed in all circuit positions
- MIL-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
- Two-part polyurethane slate gray finish

▶ Toggle style panels available with white or black circuit breakers installed.



- Heavy 1/8" aluminum 5052 alloy
- Industry standard height and width
- Countersunk mounting holes throughout
- Detailed installation instructions and cutout template included
- Includes set of 30 common Large Format Labels (page 83)
- Over 500 individual labels available (pages 84-87)
- Maximum panel amperage - 50 Amperes

3 Sources + 28 Positions



8496/8596* 3496/3596*

2 Sources + 17 Positions



8475/8575* 3475/3575*

2 Sources + 12 Positions



8468/8568* 3468/3568*

2 Sources + 14 Positions



8473/8573* 3473/3573*

2 Sources + 9 Positions



8462/8562* 3462/3562*

3 Sources + 25 Positions



8494/8594* 3494/3594*

2 Sources + 8 Positions



8459/8559* 3459/3559*

3 Sources¹



8498/8598* 3498/3598*

3 Sources + 18 Positions



8458 3458*

2 Sources + 9 Positions



8466/8566* 3466/3566*

2 Sources + 6 Positions



8489/8589* 3489/3589*

2 Sources + 4 Positions



8467/8567* 3467/3567*

2 Sources + 4 Positions



8499/8599* 3499/3599*

2 Sources¹



8600/8602*

2 Sources¹



8032/8061/8132*/8161* 3032/3061/3132*/3161*

¹ Includes set of 10 source selection labels only * 230 Volt (typical of Europe)

Use the tables below to select AC Distribution Panels with AC Source Selectors where multiple sources must be managed on the panel.

120 VOLT A-Series Source Selection Raised Rocker Circuit Breaker Panels								
8600	2 Sources	Height in" (mm)	Width in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers			
					16A	30A	32A	50A
		4.25 (107.95)	5.25 (133.35)	1.84 (0.83)	-	2	-	-

230 VOLT A-Series Source Selection Raised Rocker Circuit Breaker Panels (Typical of Europe)								
8602	2 Sources	Height in" (mm)	Width in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers			
					16A	30A	32A	50A
		4.25 (107.95)	5.25 (133.35)	1.84 (0.83)	2	-	-	-

120 VOLT A-Series Source Selection Toggle Circuit Breaker Panels										
PN	PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers		Installed Single Pole Circuit Breakers
								30A	50A	15A
8032	3032	2 Sources	-	-	5.25 (133.35)	3.75 (95.25)	1.35 (0.61)	2	-	-
8061	3061	2 Sources	-	-	5.25 (133.35)	3.75 (95.25)	1.84 (0.83)	-	2	-
8498	3498	3 Sources	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	3	1	-
8467	3467	2 Sources + 4 Positions	-	-	5.25 (133.35)	7.50 (190.50)	2.15 (0.98)	2	-	2
8499	3499	2 Sources + 4 Positions	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	2	-	2
8489	3489	2 Sources + 6 Positions	Analog/9353	95	5.25 (133.35)	11.25 (285.75)	3.00 (1.36)	2	-	3
8459	3459	2 Sources + 8 Positions	-	-	14.75 (374.65)	4.50 (114.30)	3.15 (1.43)	2	-	6
8466	3466	2 Sources + 9 Positions	-	-	5.25 (133.35)	11.25 (285.75)	2.81 (1.27)	2	-	6
8462	3462	2 Sources + 9 Positions	Analog/9353	95	10.50 (266.70)	7.50 (190.50)	3.80 (1.72)	2	-	6
8468	3468	2 Sources + 12 Positions	-	-	10.50 (266.70)	7.50 (190.50)	3.75 (1.70)	2	-	8
8473	3473	2 Sources + 14 Positions	Analog/9630, 9353	95	14.75 (374.65)	7.50 (190.50)	6.00 (2.72)	2	-	11
8475	3475	2 Sources + 17 Positions	Digital/8247	92	14.75 (374.65)	7.50 (190.50)	5.30 (2.40)	2	-	11
8458	3458	3 Sources + 18 Positions	Analog/9630, 9353	95	10.50 (266.70)	13.75 (349.25)	9.10 (4.12)	3	1	12
8494	3494	3 Sources + 25 Positions	Analog/9630, 9353	95	14.75 (374.65)	11.25 (285.75)	9.00 (4.08)	3	1	16
8496	3496	3 Sources + 28 Positions	Digital/8247	92	14.75 (374.65)	11.25 (285.75)	10.10 (4.58)	3	1	19

230 VOLT A-Series Source Selection Toggle Circuit Breaker Panels (Typical of Europe)										
PN	PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Double Pole Circuit Breakers		Installed Single Pole Circuit Breakers
								16A	32A	8A
8132	3132	2 Sources	-	-	5.25 (133.35)	3.75 (95.25)	1.35 (0.61)	2	-	-
8161	3161	2 Sources	-	-	5.25 (133.35)	3.75 (95.25)	1.84 (0.83)	-	2	-
8598	3598	3 Sources	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	3	1	-
8567	3567	2 Sources + 4 Positions	-	-	5.25 (133.35)	7.50 (190.50)	2.15 (0.98)	2	-	2
8599	3599	2 Sources + 4 Positions	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	2	-	2
8589	3589	2 Sources + 6 Positions	Analog/9354	95	5.25 (133.35)	11.25 (285.75)	3.00 (1.36)	2	-	3
8559	3559	2 Sources + 8 Positions	-	-	14.75 (374.65)	4.50 (114.30)	3.15 (1.43)	2	-	6
8566	3566	2 Sources + 9 Positions	-	-	5.25 (133.35)	11.25 (285.75)	2.81 (1.27)	2	-	6
8562	3562	2 Sources + 9 Positions	Analog/9354	95	10.50 (266.70)	7.50 (190.50)	3.80 (1.72)	2	-	6
8568	3568	2 Sources + 12 Positions	-	-	10.50 (266.70)	7.50 (190.50)	3.75 (1.70)	2	-	8
8573	3573	2 Sources + 14 Positions	Analog/9630, 9354	95	14.75 (374.65)	7.50 (190.50)	6.00 (2.72)	2	-	11
8575	3575	2 Sources + 17 Positions	Digital/8247	92	14.75 (374.65)	7.50 (190.50)	5.30 (2.40)	2	-	11
8594	3594	3 Sources + 25 Positions	Analog/9630, 9354	95	14.75 (374.65)	11.25 (285.75)	9.00 (4.08)	3	1	16
8596	3596	3 Sources + 28 Positions	Digital/8247	92	14.75 (374.65)	11.25 (285.75)	10.10 (4.58)	3	1	19

120/240 Volt Source Selection Circuit Breaker Panels

- Triple pole AC Main circuit breakers with installed lockout slides
- Red reverse polarity indication LED
- All neutral, and safety ground buses installed, fully pre-wired
- Extra positions available for double pole A-Series Toggle Circuit Breakers (page 50)
- All circuit label positions are backlit on standard panels - No kit required
- "ON" indicating LEDs installed in all circuit positions
- MIL-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Includes set of 30 common Large Format Labels (page 83)
- Over 500 individual labels available (pages 84-87)
- Maximum panel amperage - 50 Amperes

Source Selector + 2 Positions



7374

Source Selector + 2 Positions



7373

Blue Sea Systems' recommends using double pole circuit breakers to fill the open positions.

120/240 VOLT Source Selection Circuit Breaker Panels

PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed C-Series Toggle 3 Pole Main
							50A
7374	Source Selector + 2 Positions	Analog/9354	95	5.25 (133.35)	11.25 (285.75)	3.70 (1.68)	2
7373	Source Selector + 2 Positions	Digital/8247	92	5.25 (133.35)	11.25 (285.75)	4.09 (1.85)	2



Blue Sea Systems 11-1/4" height 240 Volt AC Distribution Panels are designed as companion panels to the 11-1/4" height 120 Volt AC panels.

The 240 Volt AC Distribution Panel supplies main circuit protection, AC source management, 240 Volt AC metering and 240 Volt AC branch circuits. Each 120 Volt AC leg from the 240 Volt AC Distribution Panel is wired to the 120 Volt AC Distribution Panel powering the 120 Volt AC branch circuits.



Photo: Hunt Yachts, Inc.



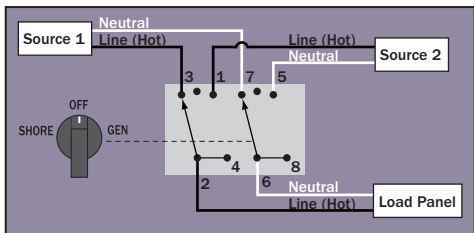
9009 Front



9009 Side



8367/8359



Rotary Switch and Panels

32 Ampere 2 Positions + OFF, 2 Pole

Rotary Switch

- Switches 2 - 120 or 230 Volt AC sources
- Compact solution when circuit protection is provided elsewhere
- Allows connecting one of two different AC sources to one circuit
- Mounts in panels up to 0.16" (4.00mm) thick
- Heavy duty industrial rated switch
- Intuitive function - One hand operation
- UL listed

Rotary Switch Panels

- **8367** Switches 2 - 120 Volt AC sources
- **8359** Switches 2 - 230 Volt AC sources
- Includes 9009 heavy duty industrial rated switch
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Red reverse polarity LED indicators
- Green power available LED indicators

Specifications

Maximum Amperage 32 Amperes AC
 Maximum Voltage 600 Volts AC

PN	Description	Voltage	Mounting Depth in" (mm)	Width in" (mm)	Height in" (mm)
9009	Rotary Switch	600V Max.	1.91 (48.51)	1.89 (48.00)	1.89 (48.00)
8367	Rotary Switch Panel	120V	1.91 (48.51)	5.25 (133.35)	3.75 (95.25)
8359	Rotary Switch Panel	230V	1.91 (48.51)	5.25 (133.35)	3.75 (95.25)

Rotary Switch and Panels

65 Ampere 2 Positions + OFF, 2 Pole

Rotary Switch

- Switches 2 - 120 or 230 Volt AC sources
- Compact solution when circuit protection is provided elsewhere
- Allows connecting one of two different AC sources to one circuit
- Mounts in panels up to 0.16" (4.00mm) thick
- Heavy duty industrial rated switch
- Intuitive function - One hand operation
- UL listed

Rotary Switch Panels

- **8365** Switches 2 - 120 Volt AC sources
- **8357** Switches 2 - 230 Volt AC sources
- Includes 9011 heavy duty industrial rated switch
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Red reverse polarity LED indicators
- Green power available LED indicators

Specifications

Maximum Amperage 65 Amperes AC
 Maximum Voltage 600 Volts AC

PN	Description	Voltage	Mounting Depth in" (mm)	Width in" (mm)	Height in" (mm)
9011	Rotary Switch	600V Max.	2.41 (61.21)	2.52 (64.00)	2.52 (64.00)
8365	Rotary Switch Panel	120V	2.41 (61.21)	5.25 (133.35)	3.75 (95.25)
8357	Rotary Switch Panel	230V	2.41 (61.21)	5.25 (133.35)	3.75 (95.25)



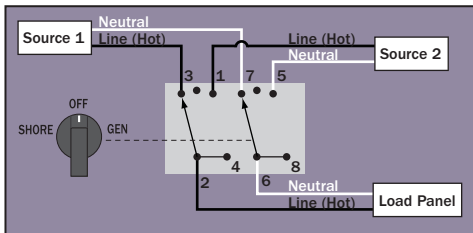
9011 Front



9011 Side



8365/8357



AC MAIN SOURCE SELECTION

Rotary Switch and Panel

65 Ampere 2 Positions + OFF, 3 Pole

Rotary Switch

- Switches 2 - 120/240 Volt AC sources
- Switches both lines (hots) and neutral
- Compact solution when circuit protection is provided elsewhere
- Allows connecting one of two different AC sources to one circuit
- Mounts in panels up to 0.16" (4.00mm) thick
- Heavy duty industrial rated switch
- Intuitive function - One hand operation
- UL listed

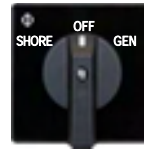
Rotary Switch Panel

- Switches 2 - 120/240 Volt AC sources
- Includes 9019 heavy duty industrial rated switch
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Red reverse polarity LED indicators
- Green power available LED indicators

Specifications

Maximum Amperage 65 Amperes AC
Maximum Voltage 600 Volts AC

PN	Description	Voltage	Mounting Depth in" (mm)	Width in" (mm)	Height in" (mm)
9019	Rotary Switch	600V Max.	3.65 (92.71)	2.52 (64.00)	2.52 (64.00)
8363	Rotary Switch Panel	120/240V	3.65 (92.71)	5.25 (133.35)	3.75 (95.25)



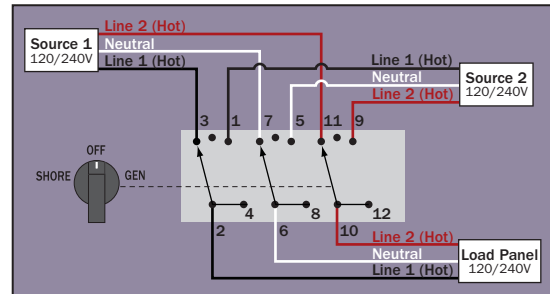
9019 Front



9019 Side



8363



Rotary Switches and Panels

30 and 65 Ampere 2 Positions + OFF, 4 Pole

Rotary Switch

- Switches between 2 - 120 Volt AC shore power sources and 1 - 240 Volt AC source to 2 - 120 Volt AC load groups
- Switches both lines (hots) and neutral
- Compact solution when circuit protection is provided elsewhere
- Allows connecting one of two different AC sources to one circuit
- Mounts in panels up to 0.16" (4.00mm) thick
- Heavy duty industrial rated switch
- Intuitive function - One hand operation
- UL listed

Rotary Switch Panel

- Switches between 2 - 120 Volt AC shore power sources and 1 - 240 Volt AC source to 2 - 120 Volt AC load groups
- **8386** - Includes 6337 heavy duty industrial rated switch
- **8369** - Includes 9093 heavy duty industrial rated switch
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Red reverse polarity LED indicators
- Green power available LED indicators

Specifications

Maximum Amperage **6337/8386** - 30 Amperes AC
9093/8369 - 65 Amperes AC
Maximum Voltage 600 Volts AC

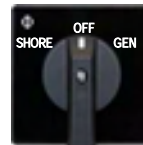
PN	Description	Voltage	Mounting Depth in" (mm)	Width in" (mm)	Height in" (mm)
6337	Rotary Switch	600V Max.	2.98 (75.69)	1.89 (48.00)	1.89 (48.00)
9093	Rotary Switch	600V Max.	4.50 (114.30)	2.52 (64.00)	2.52 (64.00)
8386	Rotary Switch Panel	120V	2.98 (75.69)	5.25 (133.35)	3.75 (95.25)
8369	Rotary Switch Panel	120V	4.50 (114.30)	5.25 (133.35)	3.75 (95.25)



6337 Front



6337 Side



9093 Front



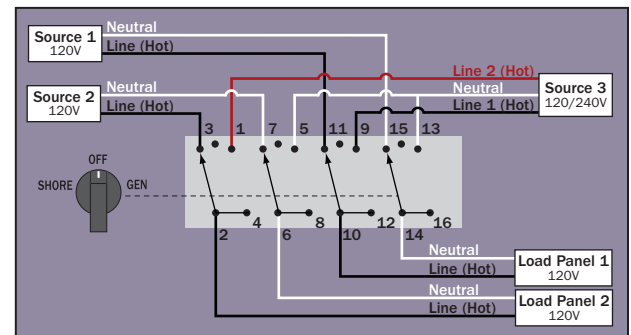
9093 Side

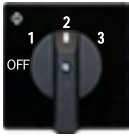


8386



8369





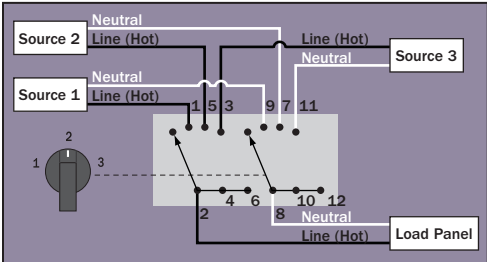
9010 Front



9010 Side



8366/8358



Rotary Switch and Panels

32 Ampere 3 Positions + OFF, 2 Pole

Rotary Switch

- Switches 3 - 120 or 230 Volt AC sources
- Compact solution when circuit protection is provided elsewhere
- Allows connecting three different AC sources to one circuit
- Mounts in panels up to 0.16" (4.00mm) thick
- Heavy duty industrial rated switch
- Intuitive function - One hand operation
- UL listed

Rotary Switch Panel

- **8366** - Switches 3 - 120 Volt AC sources
- **8358** - Switches 3 - 230 Volt AC sources
- Includes 9010 heavy duty industrial rated switch
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Red reverse polarity LED indicators
- Green power available LED indicators

Specifications

Maximum Amperage 32 Amperes AC
 Maximum Voltage 600 Volts AC

PN	Description	Voltage	Mounting Depth in" (mm)	Width in" (mm)	Height in" (mm)
9010	Rotary Switch	600V Max.	2.41 (61.21)	1.89 (48.00)	1.89 (48.00)
8366	Rotary Switch Panel	120V	2.41 (61.21)	5.25 (133.35)	3.75 (95.25)
8358	Rotary Switch Panel	230V	2.41 (61.21)	5.25 (133.35)	3.75 (95.25)



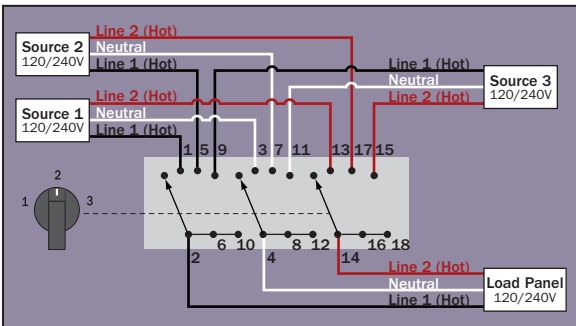
9077 Front



9077 Side



8361



Rotary Switch and Panel

65 Ampere 3 Positions + OFF, 3 Pole

Rotary Switch

- Switches 3 - 120/240 Volt AC sources
- Switches both lines (hot) and neutral
- Compact solution when circuit protection is provided elsewhere
- Allows connecting one of three different AC sources to one circuit
- Mounts in panels up to 0.16" (4.00mm) thick
- Heavy duty industrial rated switch
- Intuitive function - One hand operation
- UL listed

Rotary Switch Panel

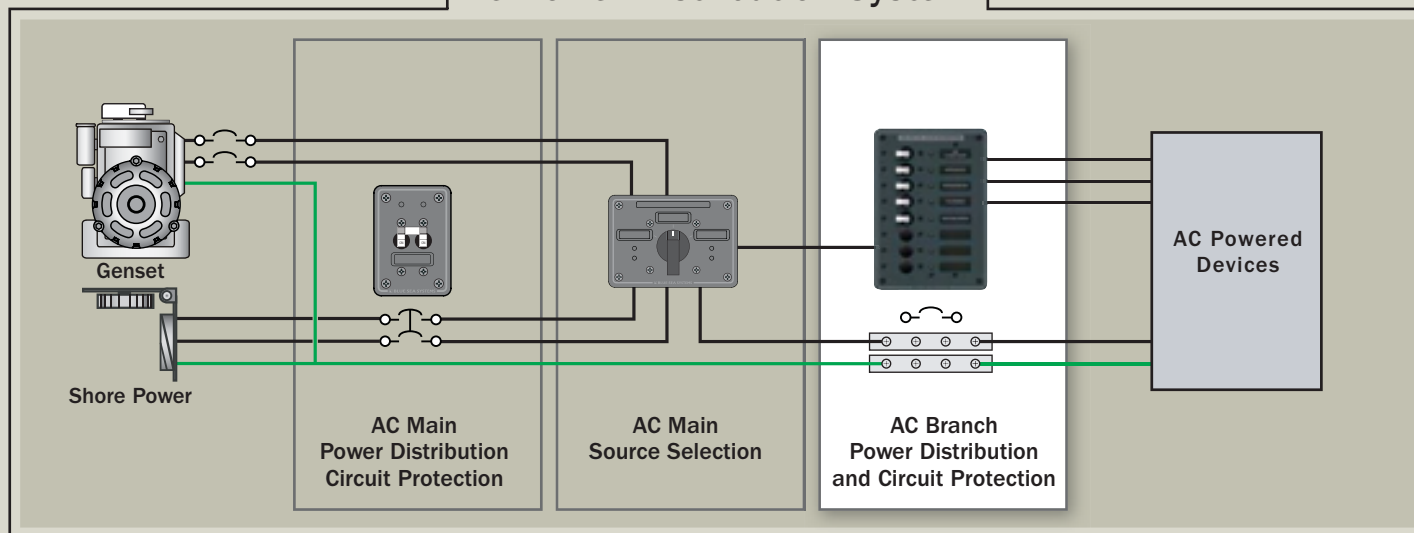
- Switches 3 - 120/240 Volt AC sources
- Includes 9077 heavy duty industrial rated switch
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Red reverse polarity LED indicators
- Green power available LED indicators

Specifications

Maximum Amperage 65 Amperes AC
 Maximum Voltage 600 Volts AC

PN	Description	Voltage	Mounting Depth in" (mm)	Width in" (mm)	Height in" (mm)
9077	Rotary Switch	600V Max.	5.50 (139.70)	2.52 (64.00)	2.52 (64.00)
8361	Rotary Switch Panel	120/240V	5.50 (139.70)	5.25 (133.35)	3.75 (95.25)

AC Power Distribution System



AC Branch Power Distribution and Circuit Protection

Definition

The AC Branch power system begins at the line terminal connection of the AC branch circuit breaker for the hot wire and at the branch circuit connection block for the neutral and safety ground wires. It ends at the AC outlet or the AC device that is powered. The devices used for AC branch power distribution are the same devices used for AC branch circuit protection.

Purpose

The purpose of AC Branch power distribution and circuit protection is to distribute high amperage currents from a single cable into lower amperages in multiple wires, and provide circuit protection and switching. Circuit breakers used for AC Branch switching and circuit protection always have one pole less than the AC main installed between the branch circuit breaker and the AC power source. This circuit breaker is installed in the AC hot conductor.

Products in this Section







Circuit Breakers: Circuit breakers used in AC branch power systems may be single or double pole, rocker and toggle, with current ratings from 5 to 100A.


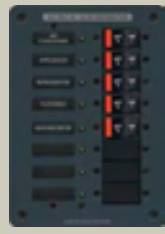
Power Distribution and Circuit Protection Panels: Panels are available with 3 to 26 positions, toggle and rocker circuit breakers for 120V and 230V (Typical of Europe) ratings, with and without meters.



For more information about AC Branch Power Distribution and Circuit Protection, refer to page 118 in this catalog.

Blue Sea Systems uses circuit breakers manufactured by Carling Technologies®, Airpax®, and Cooper Bussmann®.



Single Pole Circuit Breakers and Mounting Panel Pages 66-67						
	A-Series Toggle 5-50 Amperes	A-Series Raised Rocker 5-50 Amperes	A-Series Flat Rocker 5-50 Amperes	A-Series Slot Reset Rocker 5-50 Amperes	C-Series Toggle 5-100 Amperes	A-Series Toggle Mounting Panel
100						
75						
50						
25						
0						

A-Series Raised Rocker Panels Pages 68-69	
120 Volt	230 Volt (Typical of Europe)
	

A-Series Toggle Panels Pages 68-69	
120 Volt	230 Volt (Typical of Europe)
	

A-Series Toggle Circuit Breakers Single Pole

- The industry standard circuit breaker for Blue Sea Systems' electrical panels
- Combines switching and circuit protection into a single device
- "Trip Free" design cannot be held "ON" during fault current condition
- Used with A-Series Toggle Circuit Breaker Mounting Panel (see below)

Specifications

Interrupt Rating	See Interrupt Rating table below
Maximum Voltage	277 Volts AC/65 Volts DC
Circuit Breaker Type	Magnetic Hydraulic - Trip free
Operating Temperature Range	-40°C to +85°C
Terminal Screw	#10-32 SS with external tooth lockwasher - Recommended torque 14-15 in-lb
Trip Time Delay	See www.blueseasystems.com
Rated Switch Cycles	10,000@rated amperage and voltage
Mounting Screw	#6-32 SS - Recommended torque 6-8 in-lb
Weight	0.17Lb (0.08Kg)

Certifications

- CE marked

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 118)

A-Series Toggle Circuit Breakers - Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - TUV (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	5-50A	7,500A	1,500A
120V AC	5-50A	3,000A	1,500A
250V AC	5-50A	3,000A	1,500A

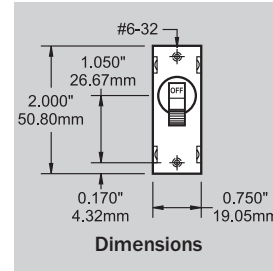
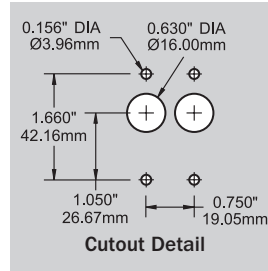
¹ UL Recognized

PN	Color	Amperage
7200	Black	5A
7201	Red	5A
7202	White	5A
7347	Black	8A
7299	White	8A
7204	Black	10A
7205	Red	10A
7206	White	10A
7208	Black	15A
7209	Red	15A
7210	White	15A
7212	Black	20A
7213	Red	20A

PN	Color	Amperage
7214	White	20A
7216	Black	25A
7217	Red	25A
7218	White	25A
7220	Black	30A
7221	Red	30A
7222	White	30A
7224	Black	40A
7225	Red	40A
7226	White	40A
7228	Black	50A
7229	Red	50A
7230	White	50A



7200



A-Series Toggle Circuit Breaker Mounting Panel Single Pole

- Mounts A-Series Toggle Circuit Breaker *single pole* (see above) or Panel Switch (page 78)
- Slate gray matches standard panel color

Specifications

Panel Material: Heavy 1/8" aluminum 5052 alloy

PN	Description	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)
8072	Mounting Panel - Single Pole	2.63" (66.80)	3.75" (95.25)	0.08 (0.04)



8072

A-Series Raised Rocker Circuit Breakers Single Pole

- Rocker actuator gives modern appearance to electrical distribution panels
- Dual color rocker gives clear visual indication of handle position
- "Trip Free" design cannot be held "ON" during fault current condition

Specifications

Interrupt Rating	See Interrupt Rating table below
Maximum Voltage	250 Volts AC/80 Volts DC
Circuit Breaker Type	Magnetic Hydraulic - Trip free
Operating Temperature Range	-40°C to +85°C
Terminal Screw	#10-32 SS with external tooth lockwasher - Recommended torque 14-15 in-lb
Trip Time Delay	See www.blueseasystems.com
Rated Switch Cycles	10,000@rated amperage and voltage
Mounting Screw	#6-32 SS - Recommended torque 6-8 in-lb
Weight	0.20Lb (0.09Kg)

Certifications

- CE marked

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 118)

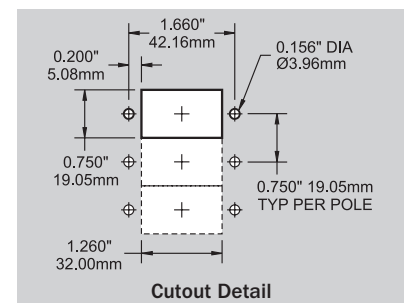
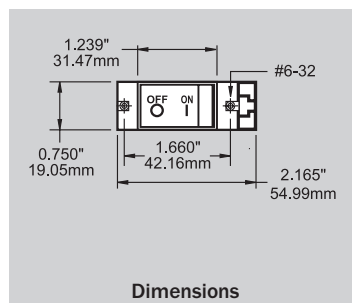
A-Series Raised Rocker Circuit Breakers - Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - VDE (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	5-50A	-	2,000A
80V DC	5-30A	-	4,000A
80V DC	5-50A	7,500A	-
125V AC	5-50A	3,000A	-
250V AC	5-30A	2,000A	2,000A
250V AC	5-50A	-	2,000A

¹ UL Recognized

PN	Amperage
7300	5A
7301	8A
7302	10A
7303	15A
7304	20A
7305	25A
7306	30A
7307	40A
7308	50A
4110	Panel Plug Kit



7300



A-Series Flat and Slot Reset Rocker Circuit Breakers Single Pole

Flat



7408

Slot Reset



7433

Flat Rocker		
PN	Poles	Amperage
7400	1	5A
7401	1	8A
7402	1	10A
7403	1	15A
7404	1	20A
7405	1	25A
7406	1	30A
7407	1	40A
7408	1	50A

Slot Reset Rocker		
PN	Poles	Amperage
7425	1	5A
7426	1	8A
7427	1	10A
7428	1	15A
7429	1	20A
7430	1	25A
7431	1	30A
7432	1	40A
7433	1	50A

- Color actuator indicates "OFF" position
- Rocker actuator is flush in the "ON" position, eliminating risk of accidental switching
- "Trip Free" design cannot be held "ON" during fault current condition
- 2 different actuator styles available to protect accidental switching
- International ON/OFF symbols support vertical or horizontal mounting

Specifications

Interrupt Rating See Interrupt Rating table below
 Maximum Voltage 250 Volts AC/80 Volts DC
 Circuit Breaker Type Magnetic Hydraulic - Trip free
 Operating Temperature Range -40°C to +85°C
 Terminal Screw 45° Angled #10-32 x 5/16 SS SEM external tooth lock washer
 - Recommended torque 14-15 in-lb
 Trip Time Delay See www.blueseas.com
 Rated Switch Cycles 10,000@rated amperage and voltage
 Mounting Screw #6-32 SS - Recommended torque 6-8 in-lb

Certifications

- CE marked

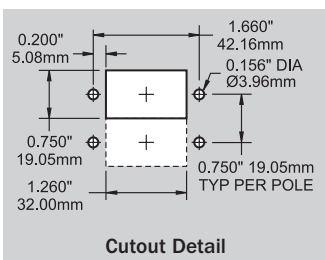
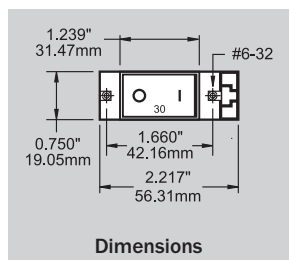
Agency Standards

- UL 1077 recognized

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 118)

A-Series Flat and Slot Reset Rocker Circuit Breakers - Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - VDE (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
65V DC	5-50A	-	2,000A
80V DC	5-30A	-	4,000A
80V DC	5-50A	7,500A	-
125V AC	5-50A	3,000A	-
250V AC	5-30A	2,000A	2,000A
250V AC	5-50A	-	2,000A

¹ UL Recognized



7250

PN	Amperage	Weight Lb (Kg)
7350	5A	0.28 (0.13)
7351	10A	0.28 (0.13)
7352	15A	0.28 (0.13)
7353	20A	0.28 (0.13)
7354	25A	0.28 (0.13)
7355	30A	0.28 (0.13)
7244	50A	0.36 (0.17)
7246	60A	0.36 (0.17)
7248	80A	0.36 (0.17)
7250	100A	0.36 (0.17)

C-Series Toggle Circuit Breakers Single Pole

- "Trip Free" design cannot be held "ON" during fault current condition

Specifications

Interrupt Rating See Interrupt Rating table below
 Maximum Voltage 250 Volts AC/80 Volts DC
 Terminal Stud 1/4"-20 tin plated brass - Maximum torque 35 in-lb
 Circuit Breaker Type Magnetic Hydraulic - Trip free
 Delay See www.blueseas.com
 Mounting Screw #6-32 SS - Recommended torque 6-8 in-lb

Agency Standards

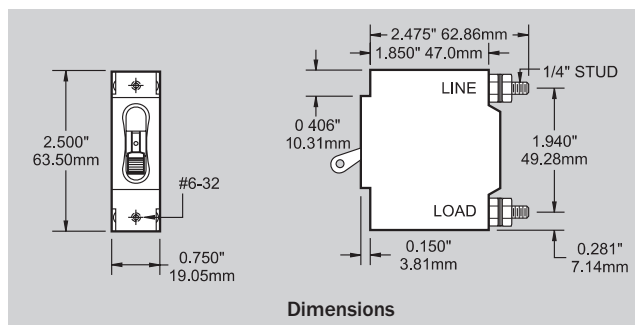
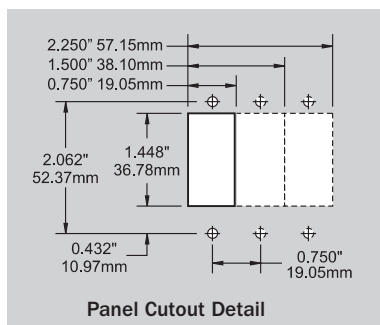
- UL 1077 recognized

Interrupt Ratings (see ABYC Interrupt Rating Requirements page 118)

C-Series Circuit Breakers Single Pole			
		UL 1077 - UL/CSA (US/Canada) ¹	EN60934 - TUV (Europe)
Voltage	Current	Interrupt Ratings	Interrupt Ratings
80V DC	5-100A	10,000A	5,000A
125V AC	5-100A	5,000A	5,000A
250V AC	5-100A	5,000A	5,000A

¹ UL Recognized

► See page 52 for C-Series Toggle Circuit Breaker Mounting Panels.



A-Series Circuit Breaker Panels

Common Features

▶ Toggle style panels available with white or black circuit breakers installed.

- All hot, neutral, and safety ground buses installed, fully pre-wired
- All circuit label positions are backlit on standard panels - No kit required
- "ON" indicating LEDs installed in all circuit positions
- MIL-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
- Two-part polyurethane slate gray finish
- Heavy 1/8" aluminum 5052 alloy
- Industry standard height and width
- Countersunk mounting holes throughout
- Detailed installation instructions and cutout template included
- Includes set of 30 common Large Format Labels (page 83)
- Over 500 individual labels available (pages 84-87)
- Maximum panel amperage - 100 Amperes

36 Position



8484/8584* 3484/3584*

24 Position



8265/8165* 3265/3165*

12 Position



8460/8560* 3460/3560*

10 Position



8478/8578* 3478/3578*

13 Position



8480/8580* 3480/3580*

13 Position



8479/8579* 3479/3579*

16 Position



8461/8561* 3461/3561*

6 Position



8097/8197* 3097/3197*

8 Position



8411/8511* 3411/3511*

8 Position



8059/8159* 3059/3159*

8 Position



8612/8613*

3 Position



8058/8158* 3058/3158*

3 Position



8610/8611*

*230 Volt (typical of Europe)

Use the tables below to select AC Distribution Panels with AC Branch Circuit Breakers where a single AC electrical source is brought to the panel and AC Main Circuit Protection has been provided elsewhere.

120 VOLT A-Series Raised Rocker Circuit Breaker Panels								
PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Single Pole Circuit Breakers	
							8A	15A
8610	3 Position	-	-	5.25 (133.35)	3.75 (95.25)	1.14 (0.52)	-	3
8612	8 Position	-	-	5.25 (133.35)	7.50 (190.50)	2.06 (0.93)	-	5

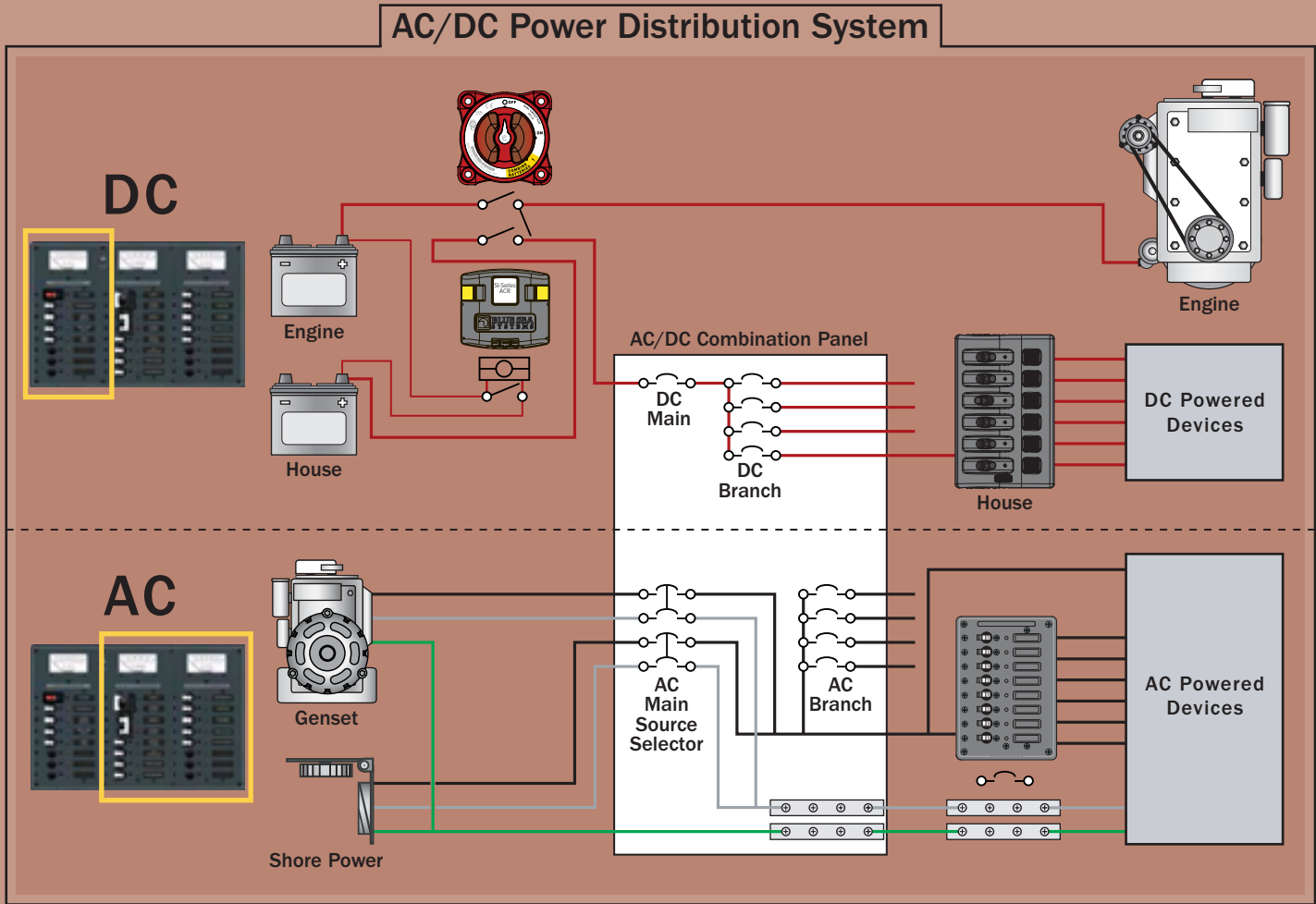
230 VOLT A-Series Raised Rocker Circuit Breaker Panels (Typical of Europe)								
PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Single Pole Circuit Breakers	
							8A	15A
8611	3 Position	-	-	5.25 (133.35)	3.75 (95.25)	1.14 (0.52)	3	-
8613	8 Position	-	-	5.25 (133.35)	7.50 (190.50)	2.06 (0.93)	5	-

120 VOLT A-Series Toggle Circuit Breaker Panels									
PN	PN	Description	Meter Type/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Single Pole Circuit Breakers	
								8A	15A
8058	3058	3 Position	-	-	5.25 (133.35)	3.75 (95.25)	1.20 (0.54)	-	3
8097	3097	6 Position	-	-	10.50 (266.70)	3.75 (95.25)	2.22 (1.00)	-	6
8059	3059	8 Position	-	-	5.25 (133.35)	7.50 (190.50)	2.00 (0.91)	-	5
8411	3411	8 Position	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	-	6
8478	3478	10 Position	Analog/9353	95	5.25 (133.35)	11.25 (285.75)	3.00 (1.36)	-	7
8460	3460	12 Position	-	-	14.75 (374.64)	4.50 (114.30)	3.15 (1.43)	-	10
8479	3479	13 Position	Analog/9353	95	10.50 (266.70)	7.50 (190.50)	4.05 (1.84)	-	10
8480	3480	13 Position	-	-	5.25 (133.35)	11.25 (285.75)	2.81 (1.27)	-	10
8461	3461	16 Position	-	-	10.50 (266.70)	7.50 (190.50)	3.74 (1.70)	-	10
8265	3265	24 Position	-	-	14.75 (374.65)	7.50 (190.50)	5.12 (3.32)	-	15
8484	3484	36 Position	Digital/8247	92	14.75 (374.65)	11.25 (285.75)	10.00 (4.54)	-	27

230 VOLT A-Series Toggle Circuit Breaker Panels (Typical of Europe)									
PN	PN	Description	Meter/PN	Meter Page	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed Single Pole Circuit Breakers	
								8A	15A
8158	3158	3 Position	-	-	5.25 (133.35)	3.75 (95.25)	1.20 (0.54)	3	-
8197	3197	6 Position	-	-	10.50 (266.70)	3.75 (95.25)	2.22 (1.00)	6	-
8159	3159	8 Position	-	-	5.25 (133.35)	7.50 (190.50)	2.00 (0.91)	5	-
8511	3511	8 Position	-	-	10.50 (266.70)	4.50 (114.30)	1.90 (0.86)	6	-
8578	3578	10 Position	Analog/9354	95	5.25 (133.35)	11.25 (285.75)	3.00 (1.36)	7	-
8560	3560	12 Position	-	-	14.75 (374.64)	4.50 (114.30)	3.15 (1.43)	10	-
8579	3579	13 Position	Analog/9354	95	10.50 (266.70)	7.50 (190.50)	4.05 (1.84)	10	-
8580	3580	13 Position	-	-	5.25 (133.35)	11.25 (285.75)	2.81 (1.27)	10	-
8561	3561	16 Position	-	-	10.50 (266.70)	7.50 (190.50)	3.74 (1.70)	10	-
8165	3165	24 Position	-	-	14.75 (374.65)	7.50 (190.50)	5.12 (3.32)	15	-
8584	3584	36 Position	Digital/8247	92	14.75 (374.65)	11.25 (285.75)	10.00 (4.54)	27	-



Photo: CABO YACHTS 45 EXPRESS - Cabo® Yachts



AC/DC Combination Panels and Circuit Protection

Definition

Power distribution panels that contain AC power distribution and circuit protection, and DC power distribution and circuit protection.

Purpose

AC/DC combination panels provide AC power distribution and DC power distribution in one panel for convenience of installation, and to centralize the control of both the AC and DC systems into one location.

Products in this Section

AC/DC Combination Power Distribution and Circuit Protection Panels: The AC side of the panel contains AC main circuit protection plus 6 to 12 positions. The DC side of the panel contains DC main circuit protection plus 7 to 29 positions. All AC/DC combination panels have meters.

Circuit Breakers: Toggle and rocker type circuit breakers rated for both AC and DC are available from Blue Sea Systems. They have current ratings from 5 to 100 Amperes, and maximum voltage ratings of 125 and 250 Volts AC, and up to 65 and 80 Volts DC.

Blue Sea Systems uses circuit breakers manufactured by Carling Technologies®, Airpax®, and Cooper Bussmann®.



A-Series Raised Rocker Circuit Breaker Panels Pages 72-73

120 Volt



230 Volt (Typical of Europe)



A-Series Main Toggle Circuit Breaker Panels Pages 72-73

120 Volt



230 Volt (Typical of Europe)



A-Series Source Selection Toggle Circuit Breaker Panels Pages 72-73

120 Volt



230 Volt (Typical of Europe)



Detailed information about these circuit breakers is located in the DC Main Circuit Protection and AC Branch Power Distribution and Circuit Protection Sections

Single Pole AC/DC Circuit Breakers Pages 26, 66-67

	A-Series Toggle 5-50 Amperes	A-Series Raised Rocker 5-50 Amperes	A-Series Flat Rocker 5-50 Amperes	A-Series Slot Reset 5-50 Amperes	C-Series Toggle 5-300 Amperes
300					
50					
25					
0					

Combination AC/DC Circuit Breaker Panels

Common Features

- All AC and DC buses installed, fully pre-wired
- Label backlighting pre-installed
- "ON" indicating LEDs installed in all circuit positions
- MIL-C-5541C or equivalent immersion undercoating for lifetime corrosion resistance
- Two-part polyurethane slate gray finish
- 100 Ampere C-Series Toggle Circuit Breaker provides main circuit protection and switching for DC branch circuits (except for 8684 and 8685)

AC Main + 6 Positions/DC 16 Position



8684/8685*

DC Features

- Owner upgradable to 24 Volt DC with 8240, 18-32 Volt DC Voltmeter (page 94)

AC Main + 8 Positions/DC Main + 29 Positions



8095/8195* 3095/3195*

DC Features

- Owner upgradable to 24 Volt DC with 8240, 18-32 Volt DC Voltmeter (page 94)

AC Main + 6 Positions/DC Main + 15 Positions



8084/8184* 3084/3184*

AC Features

- Ready for installation of optional 4029 AC Isolation Cover (page 80)

DC Features

- Owner upgradable to 24 Volt DC with 8240, 18-32 Volt DC Voltmeter (page 94)

* 230 Volt (typical of Europe)

▶ Toggle style panels available with white or black circuit breakers installed.

- Heavy 1/8" aluminum 5052 alloy
- Countersunk mounting holes throughout
- Detailed installation instructions and cutout template included
- Includes set of 60 common AC and DC Large Format Labels (page 83)
- Over 500 individual labels available (pages 84-87)
- Maximum panel amperage - 100 Amperes DC/50 Amperes AC

AC Main + 6 Positions/DC Main + 18 Positions



8408/8508* 3408/3508*

AC Features

- Ready for installation of optional 4029 AC Isolation Cover (see page 80)

DC Features

- Owner upgradable to 24 Volt DC with 8240, 18-32 Volt DC Voltmeter (page 94)

AC 3 Sources + 12 Positions/DC Main + 19 Positions



8086/8186* 3086/3186*

AC Features

- Ready for installation of optional 4031 AC Isolation Cover (see page 80)

DC Features

- Owner upgradable to 24 Volt DC with 8240, 18-32 Volt DC Voltmeter (page 96)

AC 2 Sources + 12 Positions/DC Main + 7 Positions



8085/8185* 3085/3185*

AC Features

- Ready for installation of optional 4029 AC Isolation Cover - 2 required (page 80)

DC Features

- Owner upgradable to 24 Volts DC with 8240, 18-32 Volt DC Voltmeter (page 94)

120 VOLT		AC/DC Toggle Circuit Breaker Panels										
PN	PN	Description	Voltage	Meter Type/PN	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed AC Circuit Breakers			Installed DC Circuit Breakers	
								30A	50A	15A	100A Main	15A
8085	3085	AC 2 Sources + 12 Positions DC Main + 7 Positions	120V AC 12V DC	Analog*/8003, 9630, 9353	14.75 (374.65)	10.00 (254.00)	8.75 (3.97)	2	-	9	1	4
8084	3084	AC Main + 6 Positions DC Main + 15 Positions	120V AC 12V DC	Analog*/8003, 8017, 9353	14.75 (374.65)	10.00 (254.00)	8.75 (3.97)	1	-	3	1	9
8408	3408	AC Main + 6 Positions DC Main + 18 positions	120V AC 12/24V	Digital**/8247, 8248	15.75 (400.05)	10.00 (254.00)	8.73 (3.96)	1	-	3	1	12
8086	3086	AC 3 Sources + 12 Positions DC Main + 19 Positions	120V AC 12V DC	Analog*/8003, 8017, 9630, 9353	19.50 (495.30)	11.50 (292.10)	12.45 (5.65)	3	1	6	1	13
8095	3095	AC Main + 8 Positions DC Main + 29 Positions	120V AC 12V DC	Analog*/8003, 8017, 9630, 9353	19.50 (495.30)	11.50 (292.10)	12.45 (5.65)	1	-	5	1	20

230 VOLT		AC/DC Toggle Circuit Breaker Panels (Typical of Europe)										
PN	PN	Description	Voltage	Meter Type/PN	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed AC Circuit Breakers			Installed DC Circuit Breakers	
								16A	32A	8A	100A Main	15A
8185	3185	AC 2 Sources + 12 Positions DC Main + 7 Positions	230V AC 12V DC	Analog*/8003, 9630, 9354	14.75 (374.65)	10.00 (254.00)	8.75 (3.97)	2	-	9	1	4
8184	3184	AC Main + 6 Positions DC Main + 15 Positions	230V AC 12V DC	Analog*/8003, 8017, 9354	14.75 (374.65)	10.00 (254.00)	8.75 (3.97)	1	-	3	1	9
8508	3508	AC Main + 6 Positions DC Main + 18 positions	230V AC 12/24V	Digital**/8247, 8248	15.75 (400.05)	10.00 (254.00)	8.73 (3.96)	1	-	3	1	12
8186	3186	AC 3 Sources + 12 Positions DC Main + 19 Positions	230V AC 12V DC	Analog*/8003, 8017, 9630, 9354	19.50 (495.30)	11.50 (292.10)	12.45 (5.65)	3	1	6	1	13
8195	3195	AC Main + 8 Positions DC Main + 29 Positions	230V AC 12V DC	Analog*/8003, 8017, 9630, 9354	19.50 (495.30)	11.50 (292.10)	12.45 (5.65)	1	-	5	1	20

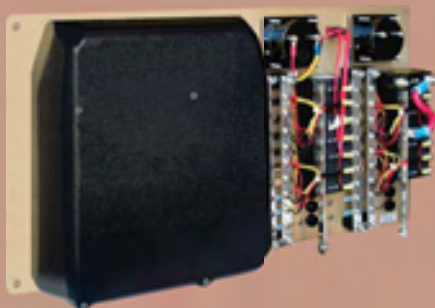
120 VOLT		AC/DC A-Series Raised Rocker Circuit Breaker Panels										
PN	Description	Voltage	Meter Type/PN	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed AC Circuit Breakers				Installed DC Circuit Breakers	
							16A	30A	8A	15A	100A Main	15A
8684	AC Main + 6 Positions DC 16 Positions	120V AC 12V DC	Analog*/8003, 8017, 9353	14.75 (374.65)	10.00 (254.00)	6.50 (2.95)	-	1	-	3	-	10

230 VOLT		AC/DC A-Series Raised Rocker Circuit Breaker Panels (Typical of Europe)										
PN	Description	Voltage	Meter Type/PN	Width in" (mm)	Height in" (mm)	Weight Lb (Kg)	Installed AC Circuit Breakers				Installed DC Circuit Breakers	
							16A	30A	8A	15A	100A Main	15A
8685	AC Main + 6 Positions DC 16 Position	230V AC 12V DC	Analog*/8003, 8017, 9354	14.75 (374.65)	10.00 (254.00)	6.50 (2.95)	1	-	3	-	-	10

* Analog meters see pages 94-95
 ** Digital meters see pages 90-93

Combined AC/DC panels require a AC Insulating Cover (page 80) to meet ABYC Standards.

ABYC E11.11.1.1. In the case of systems with a combined AC and DC panel, the panel shall be designed so that when the panel is open there is no access to energized AC parts without the use of tools.



PN 4031 Circuit Breaker Isolating Cover (page 80) Installed on PN 8086 AC/DC Toggle Style Circuit Breaker Panel (page 72)

Panel Accessories

Blue Sea Systems provides accessories for all of its above deck waterproof panels and below deck panels.

Accessories for Above Deck Waterproof Panels

Components installed on Blue Sea Systems' waterproof panels are available individually. These components include: switches, fuses, circuit breakers, fuse holders, waterproof boots, and labels.

Accessories for Below Deck Panels















Components installed on Blue Sea Systems' panels for below deck applications are available individually. These components include: mounting panels, switches, screws, plugs, LED indicator lights, backlight systems, labels, and toggle guards.

Labels

There are 4 label formats:

- Round "24-Hour" label that fits over any Blue Sea Systems' LED on any standard panel
- Square Format Labels for Blue Sea Systems' Battery Main Distribution Panels and WeatherDeck™ Waterproof panels, sold in sets
- Small Format Labels for Blue Sea Systems' Contura Waterproof Panels and ST Blade Fuse Blocks, sold in sets
- Large Format Labels used with Blue Sea Systems' rocker and toggle power distribution panels can be purchased in sets of common labels, or as individual labels.



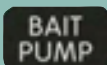
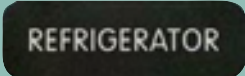
Above Deck Panel Accessories

<p>WeatherDeck™ Waterproof Panels Pages 34-37</p> 			
<p>Toggle Switches Single Pole page 76</p> 	<p>Toggle Switches Double Pole page 76</p> 	<p>Toggle Switch Boot page 76</p> 	<p>Square Format Labels page 82</p> 
<p>Contura Waterproof Circuit Breaker Panels Page 38</p> 			
<p>Contura Switches page 77</p> 	<p>Contura Switch Actuators page 77</p> 	<p>Small Format Labels page 83</p> 	
<p>Contura Waterproof Fuse Panels Page 39</p> 			
<p>Contura Switches page 77</p> 	<p>Contura Switch Actuators page 77</p> 	<p>Water Resistant Fuse Holder page 76</p> 	<p>Small and Large Format Labels page 83-87</p> 

Below Deck Panel Accessories

Panel Accessories Pages 77-81				
<p>Contura Switch Mounting Panels page 77</p> 	<p>Contura Switch Mounting Panel Plug page 77</p> 	<p>Panel Switches page 78</p> 	<p>Circuit Breaker Mounting Screws page 78</p> 	<p>Circuit Breaker Panel Plug page 78</p> 
<p>Push Button Reset Only Thermal Circuit Breaker Adapter page 78</p> 	<p>LED Indicator Lights page 79</p> 	<p>Label Backlight Systems page 79</p> 	<p>Toggle Guard page 80</p> 	
<p>Lockout Slides page 80</p> 	<p>AC Insulating Covers page 80</p> 	<p>Digital Dimmers page 81</p> 	<p>Dimmer Switches page 81</p> 	

Below Deck Panel Accessories

Labels Pages 82-87			
<p>24 Hour Round Labels page 82</p> 	<p>Square Format Labels page 82</p> 	<p>Small Format Labels page 83</p> 	<p>Large Format Labels page 83-87</p> 

WeatherDeck™ Toggle Switches Single Pole

- Specially manufactured by Carling Technologies® for use in Blue Sea Systems WeatherDeck™ Waterproof Panels (see pages 34-37)
- When mounted with a WeatherDeck™ Toggle Switch Boot (see below)
Rated IP67-temporary immersion for 30 minutes
- Nickel-plated brass and phenolic non-corrosive construction

Specifications

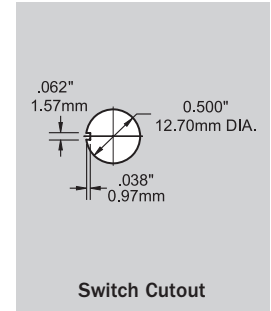
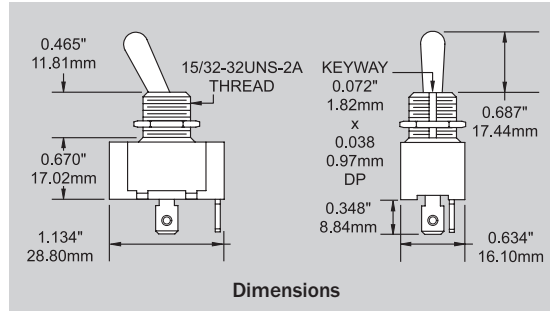
Rating: 250 Volts AC 10 Amperes
 Rating: 125 Volts AC 15 Amperes
 Rating: 12 Volts DC 15 Amperes
 Terminal Size 0.25" (6.35mm)
 Terminal Type Quick Connect Tab

PN	Pole/Throw	Action
4150	SPST	OFF - ON
4151	SPST	OFF - (ON)
4152	SPDT	ON - OFF - ON
4153	SPDT	(ON) - OFF - ON
4154	SPDT	(ON) - OFF - (ON)

() = Momentary



4150



▶ See pages 34-37 for WeatherDeck™ Waterproof Panels.

WeatherDeck™ Toggle Switch Double Pole

- For use in Blue Sea Systems WeatherDeck™ Waterproof Panels (pages 34-37)
- When mounted with a WeatherDeck™ Toggle Switch Boot (see below)
Rated IP67-temporary immersion for 30 minutes
- Nickel-plated brass and phenolic non-corrosive construction

Specifications

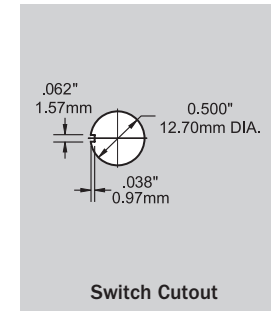
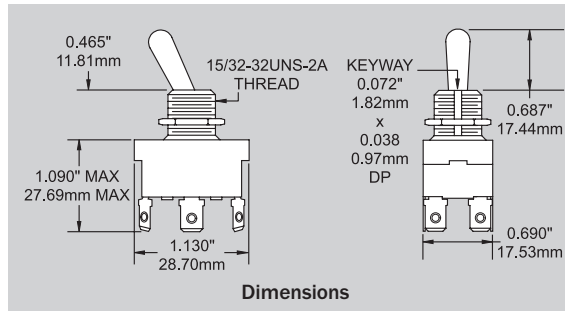
Rating: 30 Volts DC 5 Amperes
 Terminal Size 0.25" (6.35mm)
 Terminal Type Quick Connect Tab

PN	Pole/Throw	Action
4155	DPDT	ON-OFF-ON

▶ See pages 34-37 for WeatherDeck™ Waterproof Panels.



4155



WeatherDeck™ Toggle Switch Boots

- Replaces dress nut for mounting on WeatherDeck™ Waterproof Panel Switches
- Rated IP67 - temporary immersion for 30 minutes
- UV resistant material resists discoloration and cracking

Specifications

Case Material UV Resistant Silicone Rubber
 Thread Material Nickel Plated Brass
 Thread 15/32"-32UNS-2A

PN	Description	Weight Lb (Kg)
4138	Black Toggle Switch Waterproof Boot	0.04 (0.02)



4138

Water Resistant Fuse Holder

- Easy to open
- Rated IP66 on front - withstands water from heavy seas

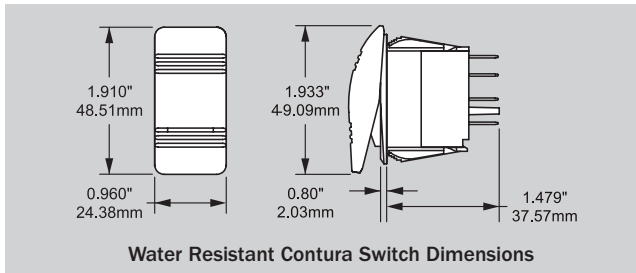
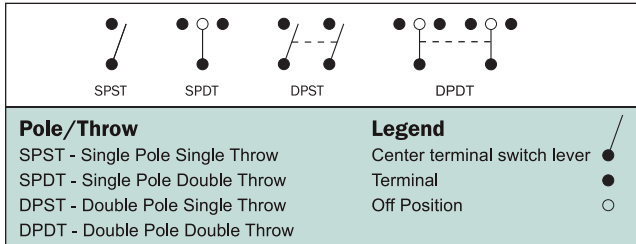
Specifications

Rating: 32 Volts DC 20 Amperes
 Mounting Hole 0.50" (12.70mm)

PN	Description	Weight Lb (Kg)
5021	Water Resistant Fuse Holder	0.02 (0.01)



5021



See pages 38-39 for Waterproof Panels.

IP IGNITION PROTECTED

Water Resistant Contura Switches **IP**

- Vibration, shock, thermoshock, moisture and salt spray resistant
- Specially manufactured for use in Blue Sea Systems' Waterproof Panels. Use of standard Contura Switches will not maintain the integrity of these panels.
- Ignition Protected - safe for installation aboard gasoline powered boats
- Meets UL 1500 and ISO 8846 ignition protection requirements

Specifications

Rating: 12 Volts DC 20 Amperes
 Rating: 24 Volts DC 15 Amperes
 Lighted LED rated 100,000 hours 1/2 life
 Seals Internal and external gasket panel seal
 Temperature Rating -40°C to 85°C
 Mounting Hole 1.45" x 0.83" (36.83mm x 21.08mm)
 LED Amperage 18 Milliampere

PN Gray	PN Black	Pole/Throw	Action	Embedded LEDs
8230	8282	SPST	OFF - ON	1
8231	8292	SPST	OFF - (ON)	0
8232	8283	SPDT	ON - OFF - ON	2
8233	8284	SPDT	(ON) - OFF - ON	1
8234	8285	SPDT	(ON) - OFF - (ON)	0
8218	8287	DPST	OFF - ON	1
8219	8288	DPST	OFF - (ON)	0
8220	8286	DPDT	ON - OFF - ON	2
8221	8289	DPDT	(ON) - OFF - ON	1
8222	8290	DPDT	(ON) - OFF - (ON)	0
8275	-	DPDT	ON - ON	2

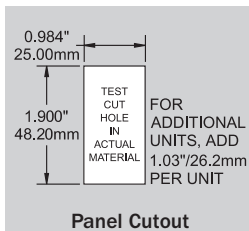
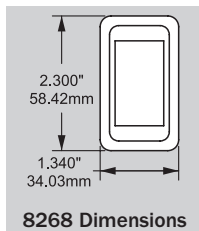
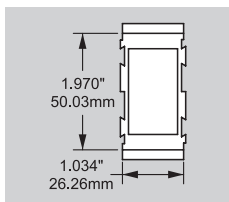
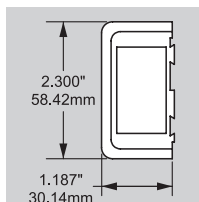
() = Momentary



PN Gray	PN Black	Number of Lenses
8299	8296	None
8297	8294	Single
8298	8295	Double
8293	Actuator Removal Tool	

Contura Switch Actuators

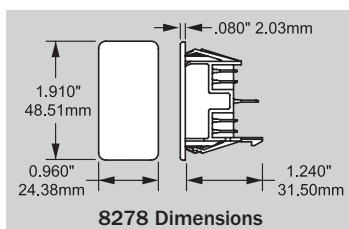
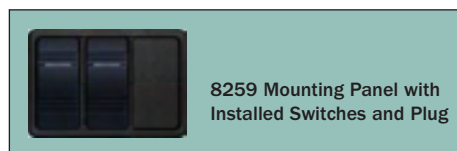
- Mounts on any Blue Sea Systems Contura switch
- Constructed of thermal plastic polycarbonate with a hard nylon surface overlay
- For each embedded LED, there is a corresponding number of lenses



Contura Switch Mounting Panels

- Modular design permits easy assembly in groups of varying sizes
- Mounting panels available in 1, 3 and 6 fixed position models
- Designed for mounting in 6 different panel thicknesses:
 0.06" (1.57mm) 0.09" (2.36mm) 0.13" (3.17mm)
 0.19" (4.75mm) 0.25" (6.35mm) 0.38" (9.52mm)

PN	Description	Width in" (mm)	Height in" (mm)
8267	End Mounting Panel	1.19 (30.23)	2.30 (58.42)
8266	Center Mounting Panel	1.03 (26.16)	2.30 (58.42)
8268	1 Position Mounting Panel	1.34 (34.04)	2.30 (58.42)
8259	3 Position Mounting Panel	3.40 (86.36)	2.30 (58.42)
8260	6 Position Mounting Panel	6.49 (164.85)	2.30 (58.42)



Contura Switch Mounting Panel Plug

- For use with Contura Switch Mounting Panels (see above)

PN	Description
8278	Mounting Panel Plug

Panel Switches

- Perfect for generator starters, bilge pumps, horns, wipers, engine controls and any other application that requires switching action other than ON-OFF or different pole configuration separate from circuit protection
- Panel switches mount in Blue Sea Systems A-Series Toggle Circuit Breaker Panels
- Supplied with mounting adapter for standard 5/8" circuit breaker mounting hole
- Nickel-plated brass and phenolic non-corrosive construction

Specifications	Toggle Switches	Push Button Switch
Rating 250 Volts AC	10 Amperes	3 Amperes
Rating 125 Volts AC	15 Amperes	6 Amperes
Rating 32 Volts DC	15 Amperes	6 Amperes
Terminal Size	0.25" (6.35mm)	0.25" (6.35mm)
Terminal Type	Quick Connect Tab	Quick Connect Tab
Actuator Color	White	White

Push Button Switch



8200

Toggle Switch



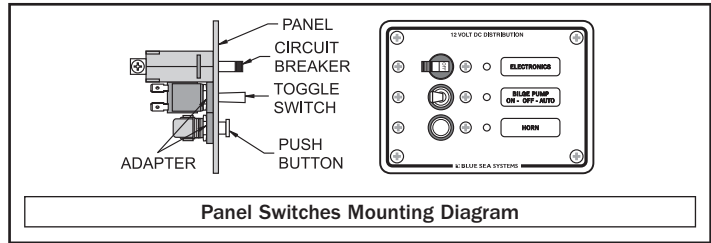
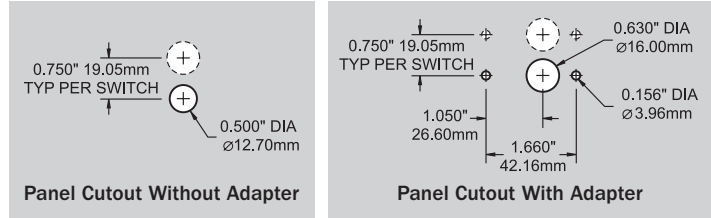
8204-8212

PN	Type	Pole/Throw	Action	Weight Lb (Kg)
8200	Push Button	SPST	OFF-(ON)	0.07 (0.03)
8204	Toggle	SPST	OFF-(ON)	0.08 (0.04)
8205	Toggle	SPST	OFF-(ON)	0.08 (0.04)
8206	Toggle	SPDT	ON-OFF-(ON)	0.08 (0.04)
8207	Toggle	SPDT	(ON)-OFF-(ON)	0.08 (0.04)
8208	Toggle	SPDT	(ON)-OFF-(ON)	0.08 (0.04)
8209	Toggle	DPST*	OFF-(ON)-(ON) OFF-(OFF)-(ON)	0.08 (0.04)
8210	Toggle	DPST	OFF-(ON)	0.08 (0.04)
8211	Toggle	DPDT	ON-OFF-(ON)	0.08 (0.04)
8212	Toggle	DPDT	(ON)-OFF-(ON)	0.08 (0.04)

() = momentary

*Progressive Two Circuit Switch - maintains circuit one while momentarily switching circuit two

► See page 66 for Mounting Panel.



Circuit Breaker Mounting Screws

- Fits all A-Series and C-Series circuit breakers
- Sold in packages of 6

PN	Description	Weight Lb (Kg)
8035	6-32 x 1/4" Flat Head	0.03 (0.01)



8035

Circuit Breaker Panel Plug

- Black plug fits standard A-Series Toggle Circuit Breaker hole

PN	Description	Weight Lb (Kg)
8037	Circuit Breaker Panel Plug	0.03 (0.01)



8037

Push Button Reset-Only Thermal Circuit Breaker Adapter

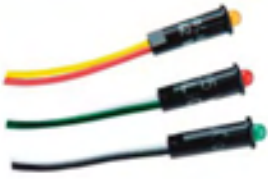
- Adapts Push Button Reset-Only Thermal Circuit Breaker (page 24) to Blue Sea Systems' rocker panels and new battery management panels

PN	Description	Weight Lb (Kg)
4111	Circuit Breaker Panel Adapter	0.03 (0.01)



4111

LED Indicator Lights



- Easily installed in any Blue Sea Systems circuit breaker panel
- Simple push-in installation mounts in any thickness material
- Useful as general indicator and alarm lights

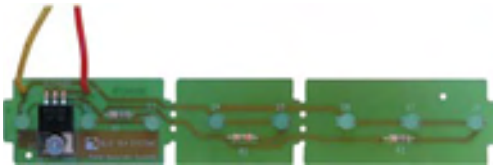
Specifications

Mounting Hole Size 11/64" (4.36mm)

CE marked

PN	Color	Voltage	Amperage Draw	Weight Lb (Kg)
8033	Amber	12/24V DC	5 Milliampers	0.03 (0.01)
8171	Red	12/24V DC	5 Milliampers	0.03 (0.01)
8172	Green	12/24V DC	5 Milliampers	0.03 (0.01)
8169	Amber	120V AC	0.5 Milliampers	0.03 (0.01)
8066	Red	120V AC	0.5 Milliampers	0.03 (0.01)
8034	Green	120V AC	0.5 Milliampers	0.03 (0.01)
8167	Amber	230V AC	0.25 Milliampers	0.03 (0.01)
8166	Red	230V AC	0.25 Milliampers	0.03 (0.01)
8134	Green	230V AC	0.25 Milliampers	0.03 (0.01)

Label Backlight System



8065

- Easily installed in Blue Sea Systems circuit breaker panels
- Designed for 12 or 24 Volt systems
- Connects to 12 or 24 Volt sources via two 20 AWG wire leads
- Backlighting is standard on panels - No kit required
- Reverse polarity protection built-in
- PN 8065 snaps apart for 5 or 3 positions

Specifications

Maximum Voltage 24 Volts DC

Amperage Draw <7 mA per label

PN	Description	Weight Lb (Kg)
8065	8/5/3 Positions	0.08 (0.04)
8384	4 Positions	0.05 (0.02)
8069	10 Positions	0.09 (0.04)
8383	13 Positions	0.11 (0.05)



Photo: Hunt Yachts, Inc.

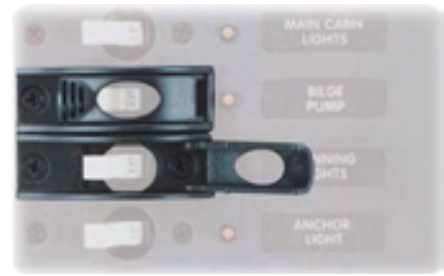
Toggle Guard

- Protects circuit breakers from being accidentally switched ON or OFF
- Fits all A-Series single pole toggle circuit breakers
- Fits all panel switches (page 78)
- Can be used on any brand of circuit breaker panel using standard toggle type circuit breakers
- Uses circuit breaker mounting screw hole
- Includes 2 mounting screws

Specifications

Material Acetal
 Mounting Hole Size #6 Flat Head Screw

PN	Description	Weight Lb (Kg)
4100	Toggle Guard	0.05 (0.02)



4100 (2 shown)

AC A-Series Circuit Breaker Lockout Slide

- Allows only 1 double pole AC circuit breaker to be activated at a time
- Guarantees that AC power from 2 or 3 sources (shore power, genset, or inverter) will not be mixed
- Fits all double pole A-Series Toggle and Raised Rocker Circuit Breakers (page 50-51)
- Uses circuit breaker mounting screw holes - Requires no modification
- Includes mounting screws

Specifications

Material Acetal
 Mounting Screw Size #6 Flat Head Screw

PN	Poles	AC Sources	Weight Lb (Kg)
4125	2	2	0.04 (0.02)
4126	2	3	0.06 (0.03)



4125



4126

AC C-Series Toggle Circuit Breaker Lockout Slide

- Allows only 1 of a pair of double pole or triple pole AC circuit breakers to be activated at a time
- Guarantees that AC power from 2 sources (shore power, genset, or inverter) will not be mixed
- Fits all double or triple pole C-Series Toggle Circuit Breakers (page 52)
- Uses circuit breaker mounting screw holes
- Requires no special panel modification
- Includes mounting screws

Specifications

Material Acetal
 Mounting Screw Size #6 Flat Head Screw

PN	Poles	Positions	Weight Lb (Kg)
4130	2	2	0.06 (0.03)
4131	3	2	0.17 (0.08)



4130



4131

AC Insulating Covers

- Provides electrical insulation for exposed panel backs
- Provides mechanical protection for panel backs protruding into lockers
- Lightweight material is easily drilled for wire entrance and exit
- Meet ABYC safety requirements for panels with combined AC and DC loads
- PN 4029 and 4031 - Used only for Blue Sea Systems' toggle circuit breaker panels

Specifications

Material ABS

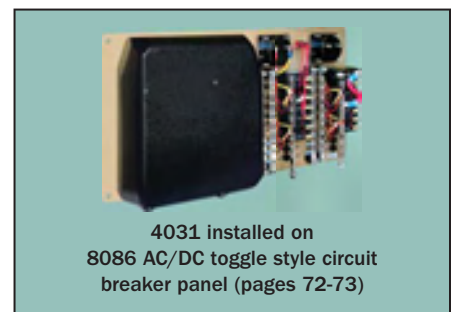
PN	Description	Weight Lb (Kg)
4026	Cover for 5-1/4" x 3-3/4"	0.12 (0.05)
4027	Cover for 5-1/4" x 7-1/2"	0.20 (0.09)
4028	Cover for 10-1/2" x 7-1/2"	0.50 (0.23)
4029	Cover for 1 Column x 8 Position + Meter	0.24 (0.11)
4031	Cover for 2 Column x 10 Position + Meter	0.38 (0.17)



4031



4027



4031 installed on 8086 AC/DC toggle style circuit breaker panel (pages 72-73)



Digital Dimmer

- Continuous voltage control from 0 to 100% of input voltage
- Last setting memory - Power returns to previous setting with optional ON/OFF switch
- Supports multiple switch locations
- -20°C to +85°C operating temperature range
- Water resistant, sealed housings
- Operates on 10 to 32 Volt DC systems
- Requires SPDT momentary (ON)-OFF-(ON) switch such as PN 8216, 8291 or 8208 (see below)

7501

- Rated for dashboard gauge or small single fixture interior dimming
- Small fans

7502

- Rated for medium to large single fixture interior dimming
- Most fans and small blowers

7503 and 7505

- Rated for multiple fixture area lighting dimming
- Large fans and blowers
- Robust aluminum housing

Specifications

	7501	7502	7503	7505
Surge Rating: 10 sec	5 Amperes	10 Amperes	25 Amperes	50 Amperes
Internal Over Current Protection	10 Amperes	20 Amperes	50 Amperes	70 Amperes
Draw 0% output	5mA (0.005A)	5mA (0.005A)	5mA (0.005A)	5mA (0.005A)

PN	Continuous Rating	Width in" (mm)	Height in" (mm)	Depth in" (mm)	Weight Lb (Kg)
7501	2A	1.67 (42.42)	2.05 (52.07)	1.50 (38.10)	0.28 (0.13)
7502	5A	2.16 (54.86)	3.06 (77.72)	1.60 (40.64)	0.40 (0.18)
7503	10A	2.16 (54.86)	3.06 (77.72)	1.60 (40.64)	0.58 (0.26)
7505	20A	2.16 (54.86)	3.06 (77.72)	1.60 (40.64)	0.56 (0.25)



8216
8291
▶ For use with Blue Sea Systems DC Digital Dimmers (see above)

Water Resistant Contura Dimmer Switches IP

- Mounts in Blue Sea Systems waterproof panels
- Legend - BRIGHT and DIM
- Contura switch mounting panel and accessories (page 77)

Specifications

Rating: 12 Volts DC	20 Amperes
Rating: 24 Volts DC	15 Amperes
Terminal Size	0.25" (6.35mm)
Terminal Type	Quick Connect Tab
Seals	Internal and External Gasket Panel Seal
Temperature Rating	-40°C to 85°C
Mounting Hole	1.45" (36.83mm) x 0.83" (21.08mm)

PN	Color	Pole/Throw	Action
8216	Gray	Single/Double	(ON)-OFF-(ON)
8291	Black	Single/Double	(ON)-OFF-(ON)

IP IGNITION PROTECTED



8208
▶ For use with Blue Sea Systems DC Digital Dimmers (see above)

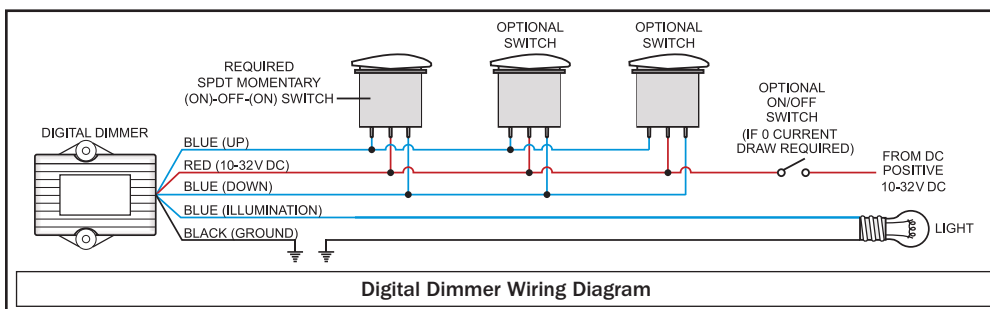
Toggle Panel Switch

- Mounts in Blue Sea Systems toggle panels

Specifications

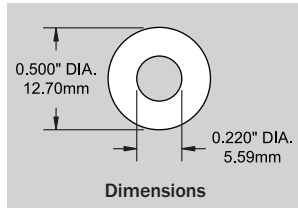
Voltage 250 Volts AC	10 Amperes
Voltage 125 Volts AC	15 Amperes
Voltage 32 Volts AC	15 Amperes
Terminal Size	0.25" (6.35mm)
Terminal Type	Quick Connect Tab
Actuator Color	White

PN	Poles/Throw	Action	Weight Lb (Kg)
8208	Single/Double	(ON)-OFF-(ON)	0.08 (0.04)



24 Hour Round Label

- Reinforced, weatherproof material
- Fits over any Blue Sea Systems LED
- Sold in packages of 12
- Used on any standard panel
- Included with Battery Main Distribution Panels (pages 14-15)

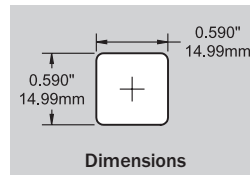
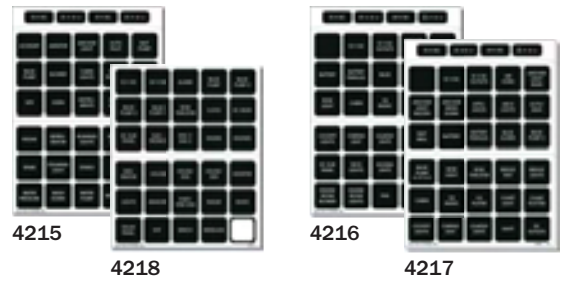


PN	Description
4140	24 Hour Round Label

Square Format Labels

- Reinforced, weatherproof material
- Used on WeatherDeck™ Waterproof Panels (pages 34-37)
- Used on Battery Management Panels (pages 12-15)
- 4215 included with WeatherDeck™ Waterproof Panels (pages 34-37)
- 4218 included with Battery Main Distribution Panels (pages 14-15)

PN	Color	Description	Quantity
4215	Black	DC Labels	30 Labels
4218	Black	DC Labels	30 Labels
4216	Black	DC Labels	60 Labels
4217	Black	DC Labels	120 Labels



Square Format Label Sets

4215 Label Set

ACCESSORY	DEPTH SOUNDER	REFRIGERATOR	VHF
AERATOR	ELECTRONICS	RUNNING LIGHTS	WASHDOWN
ANCHOR LIGHT	GPS	SEARCHLIGHT	WATER PRESSURE
AUTOPILOT	HORN	SPARE	WATER PUMP
BAIT PUMP	INSTRUMENTS	SPREADER LIGHTS	WINDLASS
BILGE PUMP	KNOTMETER	STEAMING LIGHT	WIPERS
BLOWER	NAVIGATION LIGHTS	STEREO	
CABIN LIGHTS	RADAR	TRIM TABS	

4218 Label Set

12 V DC	CLOCK	HOUSE	RADIO
24 V DC	DC MAIN	HOUSE/ENG	SOLAR PANEL
ALARM	DC SUB PANEL	HOUSE/GEN	VHF
BILGE PUMP	ELECTRONICS	INVERTER	WINCH
BILGE PUMP 2	ENGINE	LIGHTS	WINDLASS
BILGE PUMP 3	ENGINES	MEMORY	BLANK (WRITE-ON)
BILGE PUMP 4	ENG 1/ENG 2	PORT/STBD ENG	
BOW THRUSTER	GENERATOR	RADAR	

4216 Label Set

(BLANK)	BOW LIGHT	DC OUTLETS	FISHING LIGHT	INSTRUMENT LIGHTS	SSB
12 VOLT DC	CABIN	DC SUB PANEL	FISHWELL PUMP	LIGHTS	STERN LIGHT
12 VOLT DC OUTLETS	CB RADIO	DECK LIGHTS	FLOOD LIGHTS	LIVWELL	STROBE LIGHT
ANCHOR WASH DOWN	CELLULAR PHONE	DOCKING LIGHTS	FRESH WATER PUMP	MACERATOR PUMP	TRICOLOR LIGHT
BAITWELL	CHART LIGHT	DOWN RIGGER	FUEL PUMP	NAV LIGHT ANCHOR OFF NAV	TROLLING MOTOR
BATTERY	CHART PLOTTER	ELECTRIC HATCH	GALLEY OUTLETS	OUTLETS	WASHDOWN
BATTERY PARALLEL	COCKPIT LIGHTS	ENGINE ROOM BLOWER	GAS ALARM	PUMPOUT	WATER MAKER
BILGE	COMPASS LIGHT	ENGINE ROOM LIGHTS	GPS/PLOTTER	RADIO	WINCHES
BILGE PUMP 2	COURTESY LIGHTS	FAN	HEAD	SEAWATER WASH DOWN	WIPER PORT
BILGE PUMP ON-OFF-AUTO	DAVIT	FISH FINDER	IGNITION	SHOWER SUMP PUMP	WIPER STBD

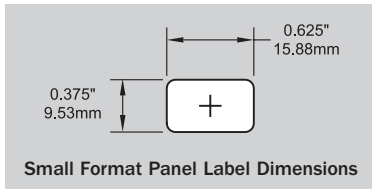
4217 Label Set

(BLANK)	BRIDGE LIGHTS	DOWN RIGGER	FOREDECK LIGHT	LIVWELL	SEAWATER WASH DOWN
12 VOLT DC	CABIN	ELECTRIC HATCH	FRESH WATER PUMP	LOCKER LIGHTS	SHOWER SUMP PUMP
12 VOLT DC OUTLETS	CB RADIO	ENGINE HATCH	FRESH WATER WASH DOWN	LPG CONTROL	SOLAR PANEL
24V DC	CD PLAYER	ENGINE INSTRUMENTS	FUEL PUMP	MAIN	SSB
AIR HORN	CHART LIGHT	ENGINE ROOM BLOWER	FUEL TRANSFER	MAST LIGHTS	START-STOP
ANCHOR LIGHT MAIN	CHART PLOTTER	ENGINE ROOM LIGHTS	FURLER JIB	MASTHEAD LIGHT	STERN LIGHT
ANCHOR LIGHT MIZZEN	COCKPIT LIGHTS	ENGINE SHUTDOWN	FURLER MAINSAIL	MIZZEN FLOOD	STROBE LIGHT
ANCHOR WASH DOWN	COMPASS LIGHT	ENTRY STEP	GALLEY	NAVIGATION ELECTRONICS	SUMP PUMP
APPLIANCES	COURTESY LIGHTS	FAN	GAS ALARM	NAVIGATION INSTRUMENTS	TRANSFER
ARCH LIGHTS	DAVIT	FAN 2	GPS/PLOTTER	NAV LIGHT ANCHOR OFF NAV	TRICOLOR LIGHT
AUTO/MAN	DC OUTLETS	FIRE ALARM	HAILER	ON-OFF	TROLLING MOTOR
BAITWELL	DC SUB PANEL	FIRE EXT	HAM RADIO	OUTLETS	WASHDOWN PUMP
BATTERY	DECK LIGHTS	FISH FINDER	HEAD	PUMPS	WASHDOWN
BATTERY PARALLEL	DEFROSTER	FISHING LIGHT	HEATER	PUMPOUT	WINCHES
BILGE ALARM	DEPTH/SPEED	FISHWELL PUMP	IGNITION	RADIO	WIND GENERATOR
BILGE PUMP 2	DIMMER	FLOOD LIGHTS	INSTRUMENT LIGHTS	ROD LOCKER	WIND INSTRUMENTS
BILGE PUMP ON-OFF-AUTO	DISCHARGE PUMP	FLYBRIDGE	INTERCOM HAILER	RUDDER ANGLE INDICATOR	WINDSHIELD WASHER
BOW LIGHT	DOCKING LIGHT PORT	FLYBRIDGE ELECTRONICS	LAZARETTE LIGHTS	SAILING CONTROLS	WIPER CENTER
BOW THRUSTER	DOCKING LIGHT STBD	FLYBRIDGE LIGHTS	LIGHTS	SAILING INSTRUMENTS	WIPER PORT
BRIDGE INSTRUMENTS	DOCKING LIGHTS	FOG LIGHTS	LIGHTER	SALT WATER PUMP	WIPER STBD



8214

8217



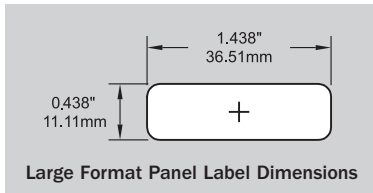
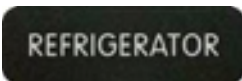
Small Format Labels

- Reinforced, weatherproof material
- 60 common DC labels
- Used on all Contura Waterproof Circuit Breaker Panels (page 38)
- Used on Contura Waterproof Fuse Panels 8261, 8262 (page 39)
- Used on ST Blade Fuse Blocks (page 45)

PN	Color	Description	Quantity
8214	Black	Small Format Labels	60 Labels
8217	Gray	Small Format Labels	60 Labels

8214 and 8217 Label Set

(BLANK)	CABIN	GAS ALARM	SEARCH LIGHT
12 VOLT DC	CABIN LIGHTS	GPS	SPARE
24 VOLT DC	CB RADIO	HORN	SPREADER LIGHTS
ACCESSORY	CELLULAR PHONE	IGNITION	STEAMING LIGHT
AERATOR	CHARGER INVERTER	INSTR. LIGHTS	STEREO
ANCHOR LIGHT	CHART PLOTTER	INVERTER	STROBE LIGHT
AUTO PILOT	DECK LIGHTS	KNOT METER	TRICOLOR LIGHT
BAIT PUMP	DEPTH SOUNDER	LIGHTS	TRIM TABS
BAITWELL	DOWN RIGGER	LIVEWELL	VHF
BATTERY	ELECTRONICS	NAV LIGHTS	WASH DOWN
BATTERY CHARGER	FAN	OUTLETS	WATER PRESSURE
BILGE	FISH FINDER	RADIO	WATER PUMP
BILGE PUMP	FISHING LIGHT	RADAR	WINCHES
BLOWER	FLOOD LIGHTS	REFRIGERATOR	WINDLASS
BOW LIGHT	FUEL PUMP	RUNNING LIGHTS	WIPERS



Large Format Labels

- Reinforced, weatherproof material
- Used on Contura Waterproof Fuse Panels 8053, 8054 (page 39)
- Used on ST Glass Fuse Blocks (page 44)
- Used on all Raised Rocker and Toggle Circuit Breaker Panels
- Large Format Labels are available for purchase individually or in sets. Individual labels and label sets are listed on pages 84-87. To purchase individual Large Format Labels online go to www.blueseas.com.

PN	Color	Description	Quantity
8031	Black	AC Panel Basic	30 Labels
8067	Black	AC Panel Extended	120 Labels
8030	Black	DC Panel Basic	30 Labels
8039	Black	DC Panel Extended	120 Labels
6396	Black	AC Panel Extended (French)	120 Labels
6397	Black	DC Panel Extended (French)	120 Labels

Note: 6396 - based on 8067.
6397 - based on 8039.

PANEL ACCESSORIES

REFRIGERATOR

Order labels online at www.blueseasystems.com.

Label Number	Description	8067 AC Extended			Label Number	Description	8067 AC Extended		
		8030 DC Basic	8031 AC Basic	8039 DC Extended			8030 DC Basic	8031 AC Basic	8039 DC Extended
1	#1				54	BEACON			
2	#2				480	BEDROOM			
3	(BLANK)		✓	✓	485	BEDROOM SLIDEOUT			
5	12 VOLT DC		✓		55	BILGE			
4	12 VOLT DC OUTLETS		✓		56	BILGE ALARM		✓	
499	12 VOLT OUTLETS INSIDE				57	BILGE ALARM 2			
500	12 VOLT OUTLETS OUTSIDE				58	BILGE ALARM 3			
502	120 VOLT 60Hz SHORE POWER				59	BILGE ALARM 4			
7	120 VOLT AC / 60 HZ			✓	60	BILGE LIGHTS			
6	120 VOLT AC OUTLETS			✓	61	BILGE PUMP	✓		
516	120/240V 60Hz				62	BILGE PUMP 2		✓	
517	120/240V 60Hz SHORE POWER				63	BILGE PUMP 3			
526	230 VOLT AC / 50 HZ				64	BILGE PUMP 4			
9	24 VOLT DC OUTLET				453	BILGE PUMP ON-OFF-AUTO			
10	24 VOLTS DC				65	BLOWER	✓		
8	240 VOLTS AC				66	BOAT DAVIT			
460	240 VOLTS AC / 60 HZ				67	BOOM LIGHT			
515	250 VOLT 50Hz SHORE POWER				68	BOW LIGHT			
468	250 VOLTS AC / 50 HZ				69	BOW THRUSTER			
462	AC BUS 1				70	BRIDGE			
11	AC COMPRESSOR			✓	71	BRIDGE INSTRUMENTS		✓	
12	AC FAN			✓	72	BRIDGE LIGHTS			✓
13	AC MAIN			✓	73	BRIDGE OUTLETS			✓
14	AC PANEL			✓	74	CABIN			✓
15	AC POWER			✓	75	CABIN 2			✓
16	AC REFRIGERATOR			✓	501	CABIN 2 FAN			
17	AC SUB PANEL			✓	76	CABIN 2 LIGHTS	✓		✓
18	ACCESSORY	✓		✓	77	CABIN 2 OUTLETS			✓
19	ADF				78	CABIN 3			✓
20	AERATOR				79	CABIN 3 LIGHTS	✓		✓
21	AFT CABIN		✓	✓	80	CABIN 3 OUTLETS			✓
22	AFT CABIN LIGHTS			✓	81	CABIN 4			✓
23	AFT CABIN OUTLETS			✓	82	CABIN 4 LIGHTS	✓		✓
24	AFT HEAD		✓	✓	83	CABIN 4 OUTLETS			✓
25	AIR COMPRESSOR				84	CABIN FAN	✓		
26	AIR CONDITIONER			✓	85	CABIN HEATER			✓
27	AIR CONDITIONER 2			✓	86	CABIN LIGHTS	✓		✓
28	AIR CONDITIONER 3			✓	87	CABIN OUTLETS		✓	
29	AIR CONDITIONER 4			✓	88	CABLEMASTER			
30	AIR CONDITIONER PUMP				89	CASSETTE PLAYER			
31	AIR HORN				90	CB RADIO	✓		
32	ALARM SYSTEM		✓	✓	91	CCTV			✓
461	ALTERNATOR				92	CD PLAYER			
33	ALTERNATOR DISCONNECT				93	CELLULAR PHONE	✓		
34	AMPLIFIER			✓	94	CHARGER/INVERTER			✓
35	ANCHOR LIGHT	✓			95	CHART LIGHT	✓		
36	ANCHOR LIGHT MAIN				96	CHART PLOTTER	✓		
37	ANCHOR LIGHT MIZZEN				97	CHOKE			
38	ANCHOR WASH DOWN		✓		98	CIRCULATOR PUMP			
39	APPLIANCES			✓	508	CLOCK			
40	ARCH LIGHTS				99	CLOSET LIGHT			
41	AUDIO/VIDEO SYSTEM			✓	100	COCKPIT LIGHTS	✓		✓
525	AUTO FILL				101	COCKPIT REFRIG			✓
42	AUTO/MAN				102	COLOR SOUNDER	✓		
524	AUTOMATIC CHARGING RELAY				103	COMM ELECTRONICS	✓		
43	AUTOPILOT	✓			104	COMPARTMENT HEATER			
44	BAIT PUMP		✓		105	COMPARTMENT LIGHT			✓
45	BAITWELL				106	COMPASS LIGHT	✓		
46	BALLAST CONTROLS				107	COMPUTER		✓	
47	BALLAST PUMP				514	COMPUTER DISPLAY			
48	BAR				108	CONDENSER PUMP			
481	BATHROOM				109	CONSOLE LIGHT			
49	BATTERY				110	CONVERTER			
473	BATTERY 1				111	COOKING GRILL			
474	BATTERY 2				112	COOKTOP			✓
50	BATTERY CHARGER			✓	113	COOLING PUMP			
51	BATTERY CHARGER 2			✓	114	COURTESY LIGHTS			
52	BATTERY COMPARTMENT				115	CREW LIGHTS			
53	BATTERY PARALLEL				116	CREW QUARTERS			

REFRIGERATOR

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Label Number	Description	8067 AC Extended			Label Number	Description	8067 AC Extended		
		8030 DC Basic	8031 AC Basic	8039 DC Extended			8030 DC Basic	8031 AC Basic	8039 DC Extended
117	DAVIT				185	FIRE ALARM			✓
118	DC LIGHTS		✓		186	FIRE EXT			
119	DC MAIN		✓		187	FIRE HORN			
120	DC OUTLETS		✓		459	FISH FINDER			
121	DC REFRIGERATOR		✓		188	FISHBOX ICEMAKER			
122	DC SUB PANEL		✓		520	FISHBOX PUMP			
123	DECK				521	FISHBOX REFRIGERATOR			
124	DECK LIGHTS		✓	✓	189	FISHING LIGHT		✓	
125	DECK LIGHTS AFT		✓		487	FISHWELL PUMP			
126	DECK LIGHTS FWD		✓		488	FISHWELL PUMP 2			
127	DECK LIGHTS PORT				190	FLOOD LIGHTS		✓	✓
128	DECK LIGHTS STBD				191	FLOSCAN			
129	DEFROSTER				192	FLYBRIDGE			
130	DEPTH RECORDER		✓		193	FLYBRIDGE ELECTRONICS		✓	
131	DEPTH SOUNDER	✓			194	FLYBRIDGE LIGHTS		✓	
132	DEPTH/SPEED		✓		195	FLYBRIDGE OUTLETS			
133	DESALINATOR		✓		196	FOG LIGHTS			
134	DIMMER		✓	✓	197	FOREDECK LIGHT		✓	
135	DINING AREA LIGHTS		✓	✓	198	FREEZER			✓
136	DINING AREA OUTLETS			✓	199	FRESH WATER			
137	DISCHARGE PUMP				200	FRESH WATER PUMP		✓	
138	DISHWASHER			✓	201	FRESH WATER PUMP 2			
139	DISPOSAL			✓	202	FRESH WATER PUMP 3			
140	DIVE COMPRESSOR				203	FRESH WATER PUMP 4			
141	DOCKING LIGHT PORT				204	FRESH WATER WASH DOWN		✓	
142	DOCKING LIGHT STBD				482	FRONT SLIDEOUT			
143	DOCKING LIGHTS		✓		205	FUEL PRIMER PUMP			
144	DOWN RIGGER				206	FUEL PUMP			
145	DRYER			✓	207	FUEL PUMP 2			
146	DUMP VALVES				208	FUEL PUMP 3			
147	ELECTRIC HATCH				209	FUEL PUMP 4			
469	ELECTRONIC CONTROL UNIT				210	FUEL TANK HEATER			
148	ELECTRONICS	✓			211	FUEL TRANSFER			
149	EMERGENCY BACKUP SYS				507	FUME DETECTOR			
150	EMERGENCY LIGHTS		✓	✓	212	FURLER JIB			
151	EMERGENCY PUMPS				213	FURLER MAINSAIL			
158	ENGINE ALARM		✓		214	FURLER SPINNAKER			
159	ENGINE BLOCK HEATER				215	FURNACE			✓
160	ENGINE CONTROL PORT				216	FWD CABIN			
161	ENGINE CONTROL STBD				217	FWD CABIN LIGHTS	✓	✓	
162	ENGINE CONTROLS				218	FWD CABIN OUTLETS		✓	
163	ENGINE DRIVEN REFRIG				219	GALLEY		✓	
164	ENGINE EXHAUST FAN				220	GALLEY APPLIANCES			✓
165	ENGINE HATCH				221	GALLEY DRAIN			
166	ENGINE HEATER PORT				222	GALLEY FAN			
167	ENGINE HEATER STBD				223	GALLEY LIGHTS		✓	✓
168	ENGINE INSTRUMENTS	✓			224	GALLEY OUTLETS		✓	
169	ENGINE OIL PAN PUMP				490	GALVANIC ISOLATOR			
152	ENGINE ROOM BILGE ALARM		✓		225	GARBAGE DISPOSAL			✓
153	ENGINE ROOM BLOWER				226	GAS ALARM			
154	ENGINE ROOM HEATER				227	GENERAL PURPOSE			
155	ENGINE ROOM LIGHTS		✓	✓	523	GENERATOR			
156	ENGINE ROOM OUTLETS			✓	228	GENERATOR 1			✓
157	ENGINE ROOM PANEL MAIN		✓		229	GENERATOR 2			
170	ENGINE SHUTDOWN				454	GENERATOR OFF-ON-START			
171	ENGINE TEMP				230	GENERATOR ROOM BLOWER			
172	ENTERTAINMENT CENTER			✓	466	GENERATOR RUNNING			
173	ENTRANCE DOOR				455	GENERATOR STOP			
174	ENTRY STEP				231	GFI OUTLET			✓
175	EXHAUST FAN			✓	232	GPS	✓		
176	EXHAUST TEMP				233	GPS/LORAN			
177	EXTERIOR				234	GPS/PLOTTER		✓	
178	EXTERIOR LIGHTS		✓	✓	510	GUN LOCKS			
179	FAN	✓		✓	235	GYRO COMPASS			
180	FAN 2		✓	✓	236	HAILER		✓	
181	FAN 3			✓	237	HALLWAY LIGHTS			✓
182	FAN 4			✓	238	HALON FIRE SYSTEM			
183	FAX				239	HAM RADIO		✓	
184	FILLING PUMP				240	HEAD		✓	

PANEL ACCESSORIES

REFRIGERATOR

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www.blueseasystems.com.

Label Number	Description	8067 AC Extended			Label Number	Description	8067 AC Extended		
		8030 DC Basic	8031 AC Basic	8039 DC Extended			8030 DC Basic	8031 AC Basic	8039 DC Extended
241	HEAD 2				298	LIGHTS PORT			
242	HEAD 2 FAN				491	LIGHTS SETTEE			
243	HEAD 2 OUTLETS			✓	299	LIGHTS STBD			
244	HEAD 3				300	LIVWELL		✓	
245	HEAD 3 FAN				301	LIVWELL INPUT			
246	HEAD 3 OUTLETS			✓	302	LIVWELL OUTPUT			
247	HEAD 4				303	LOCKER LIGHTS			
248	HEAD 4 FAN				304	LOG		✓	
249	HEAD 4 OUTLETS			✓	305	LORAN		✓	
250	HEAD FAN				306	LPG CONTROL			
251	HEAD LIGHTS		✓	✓	307	LUBE OIL PUMP			
252	HEAD LIGHTS 2		✓	✓	308	MACERATOR PUMP	✓		✓
253	HEAD LIGHTS 3			✓	309	MAIN			✓
254	HEAD LIGHTS 4			✓	310	MAIN BREAKER			✓
255	HEAD OUTLETS			✓	311	MAIN CABIN		✓	✓
256	HEADLIGHTS				312	MAIN CABIN LIGHTS	✓		✓
257	HEATER			✓	313	MAIN CABIN OUTLETS			✓
519	HEATER & AIR CONDITIONER				314	MAIN SAIL FURLING			
258	HEATER 2		✓	✓	315	MAP LIGHT		✓	
259	HEATER 3			✓	316	MAST LIGHTS		✓	
260	HEATER 4			✓	317	MASTHEAD LIGHT			
261	HELM ELECTRONICS		✓		318	MICROWAVE			✓
262	HELM GAUGES		✓		319	MINI DISC PLAYER			
263	HELM INSTRUMENTS		✓		320	MIZZEN FLOOD			
264	HIGH WATER ALARM		✓		456	NAV LIGHT ANCHOR OFF NAV			
265	HOLDING TANK		✓		321	NAV STATION ELECTRONICS		✓	
266	HOLDING TANK ALARM		✓		322	NAV STATION GAUGES		✓	
267	HOLDING TANK PUMP		✓		323	NAV STATION INSTRUMENTS		✓	
268	HOOD FAN			✓	324	NAV STATION LIGHTS		✓	✓
269	HOOD LIGHT				325	NAVIGATION ELECTRONICS		✓	
270	HORN	✓			326	NAVIGATION INSTRUMENTS		✓	
475	HOT TUB				327	NAVIGATION LIGHTS		✓	
271	HOT WATER PUMP				328	NIGHT LIGHTS			
272	HYDRAULIC ALARM				329	OFF			
273	HYDRAULIC SYSTEM				331	OIL CHANGE PUMP			
274	HYDRAULIC TANK ALARM				332	ON			
275	ICE MAKER			✓	330	ON-OFF			
276	IGNITION				333	OUTLETS			✓
277	IGNITION PORT				334	OUTLETS 2			✓
278	IGNITION STBD				335	OUTLETS 3			✓
279	INSTRUMENT LIGHTS		✓		336	OUTLETS 4			✓
280	INSTRUMENTS		✓		505	OUTLETS AFT			
281	INTERCOM		✓		337	OUTLETS DECK			✓
282	INTERCOM HAILER				506	OUTLETS ENGINE ROOM			
283	INTERCOM/TELEPHONE				338	OUTLETS EXTERIOR			✓
284	INTERIOR LIGHTS		✓	✓	503	OUTLETS FORWARD			
285	INVERTER			✓	339	OUTLETS INTERIOR			✓
467	INVERTER 2				504	OUTLETS PILOT HOUSE			
476	INVERTER AC BUS				458	PANEL LIGHTS			
471	INVERTER AC SUPPLY				496	PILOT HOUSE FAN			
470	INVERTER DC SUPPLY				340	PORT			
286	INVERTER OUTLET			✓	341	PORT THRUSTER			
287	ISOLATION TRANSFORMER			✓	342	POWER			
479	KITCHEN				343	POWER WASHER			
484	KITCHEN SLIDEOUT				457	PRE-HEAT			
288	KNOTMETER	✓			344	PRIMARY WINCHES			
289	LAZARETTE LIGHTS			✓	345	PRINTER			
290	LECTRASAN			✓	346	PUMP			
291	LIGHTER				497	PUMP BLACK WATER			
292	LIGHTS	✓	✓		498	PUMP GRAY WATER			
293	LIGHTS 2		✓	✓	347	RACK LIGHTS		✓	
294	LIGHTS 3			✓	348	RACK OUTLETS			✓
295	LIGHTS 4			✓	349	RADAR	✓		
296	LIGHTS AFT			✓	350	RADAR ARCH LIGHTS			
494	LIGHTS AFT CABIN				351	RADIO		✓	
297	LIGHTS FWD			✓	352	RANGE			✓
493	LIGHTS MASTER CABIN				353	RDF			
495	LIGHTS PANTRY				483	REAR SLIDEOUT			
492	LIGHTS PILOTHOUSE				354	RECEIVER			

REFRIGERATOR

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Label Number	Description	8067 AC Extended			Label Number	Description	8067 AC Extended		
		8030 DC Basic	8031 AC Basic	8039 DC Extended			8030 DC Basic	8031 AC Basic	8039 DC Extended
355	RECEPTACLE				418	TRANSFER PUMP			✓
356	REFRIGERATOR		✓	✓	419	TRANSFORMER			
357	REFRIGERATOR PUMP				518	TRANSFORMER SECONDARY			
358	REFRIGERATOR/FREEZER				420	TRASH COMPACTOR			✓
359	REGULATOR				478	TRAVEL LOCKS			
360	REVERSE POLARITY				421	TRICOLOR LIGHT		✓	
361	ROD LOCKER				422	TRIM TABS		✓	
489	RUDDER ANGLE INDICATOR				527	TROLLING MOTOR			
362	RUNNING LIGHTS	✓			423	TV		✓	✓
363	SAILING CONTROLS				424	TV ANTENNA			
364	SAILING INSTRUMENTS	✓			425	TV/STEREO			✓
365	SALOON		✓	✓	426	TV/VCR		✓	
366	SALOON HEATER				427	UPS SYSTEM			✓
367	SALOON LIGHTS		✓	✓	428	UTILITY		✓	
368	SALOON OUTLETS				429	VACUUM			✓
369	SALT WATER PUMP				430	VACUUM PUMP			
370	SAT/COM		✓		431	VCR			✓
371	SAT/NAV		✓		432	VHF		✓	
372	SATELLITE DISH		✓	✓	511	VHF 1			
373	SCRUBBER				512	VHF 2			
374	SEARCHLIGHT		✓		433	VIDEO PLOTTER		✓	
375	SEARCHLIGHT HAND HELD				434	VIDEO SYSTEM			✓
376	SEARCHLIGHT REMOTE				513	WASHDOWN PUMP			
377	SEAWATER TEMP		✓		435	WASHER			✓
378	SEAWATER WASH DOWN		✓		436	WASHER/DRYER			✓
379	SECURITY SYSTEM		✓		437	WATER ALARM		✓	
380	SHIP				438	WATER HEATER			✓
381	SHORE				439	WATER LEVEL			
463	SHORE 1				440	WATER MAKER		✓	✓
464	SHORE 2				441	WATER PRESSURE		✓	
382	SHORE CORD REEL				442	WATER PUMP		✓	
383	SHORE POWER				443	WEATHER FAX		✓	
384	SHORE POWER CORD				444	WEATHER INSTRUMENT		✓	
385	SHOWER SUMP PUMP		✓		445	WINCHES		✓	
386	SINK DRAIN				477	WIND GENERATOR			
486	SLIDEOUT				446	WIND INSTRUMENTS		✓	
387	SOLAR PANEL				447	WINDEX LIGHT		✓	
388	SONAR		✓		448	WINDLASS			
389	SPARE	✓		✓	522	WINDSHIELD VENT			
390	SPEED/LOG		✓		449	WINDSHIELD WASHER			
391	SPREADER LIGHTS	✓			472	WIPER CENTER			
392	SPREADER LT MIZZEN				450	WIPER PORT		✓	
393	SSB		✓		451	WIPER STBD		✓	
394	STABILIZER				452	WIPERS		✓	
395	STARBOARD								
396	START								
398	START PORT								
399	START STBD								
397	START-STOP								
400	STBD THRUSTER								
401	STEAMING LIGHT	✓							
402	STEP LIGHT								
403	STEREO	✓		✓					
404	STERN LIGHT								
509	STERN THRUSTER								
405	STOP								
406	STOVE			✓					
407	STOVE/MICROWAVE							✓	
408	STROBE LIGHT	✓							
409	SUB PANEL		✓	✓					
410	SUMP PUMP		✓						
411	SUMP PUMP 2								
412	SYNCHRO								
413	TAPE DECK								
414	TELEPHONE SYSTEM		✓	✓					
415	TEST								
416	TOWING LIGHTS								
417	TRACK LIGHTS		✓	✓					
465	TRANSFER								

Digital Meters

- Voltmeters, Ammeters, Frequency Meters, and Multimeters
- Easy spin on mounting system
- Readable in low light
- Can be rear or front panel mounted
- Direct replacement for analog meters
- Scan mode on multi-function units
- Low current drain
- Sleep mode on all units

Large, bright LED characters are easy to read in low light, at angles, and from a distance

3 levels of display brightness

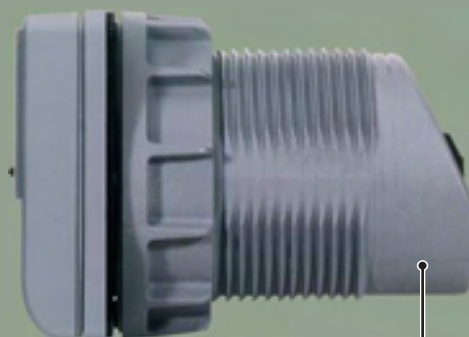
Splashproof front

Easy to panel mount with removable bezel



AC high and low voltage and high amperage alarms, both audio and visual (8247 - page 92-93)

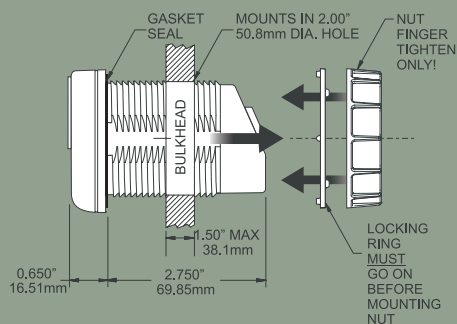
DC high and low voltage, both audio and visual (8248 and 8251 - see page 90-91)



Easy to surface mount in round 2" diameter hole

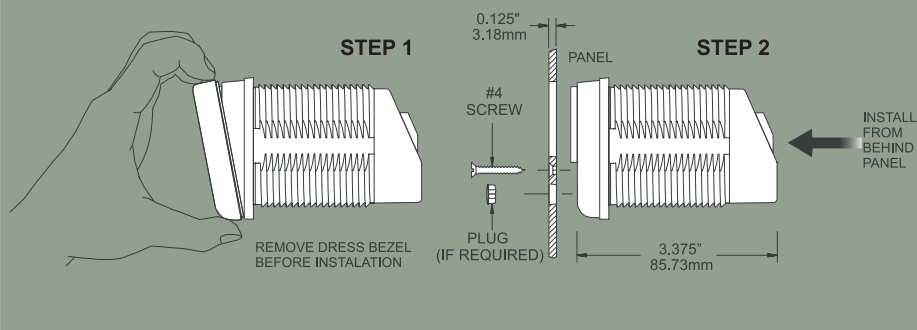
Digital Meter Front Panel Mount

Surface mounting features a finger nut and locking ring for quick and easy installation into a 2.00" (52.00mm) diameter hole.



Digital Meter Rear Panel Mount

To panel mount simply remove the bezel and mount in any Blue Sea Systems full sized meter cutout



Meters and Accessories

Definition

Meters are used to monitor a boat's:

- DC electrical system—voltage and current
- AC electrical system—voltage, current, and frequency

Purpose





Meters are necessary in a boat's electrical system to manage the system: avoiding overload of shore cords, when to charge battery banks and when chargers and alternators are not functioning properly, etc.





According to ABYC, "System voltmeters shall be installed in a main panel if the system is permanently connected to motor circuits, generators, and inverters". Frequency meters are useful for the management of generators.




Products in this Section

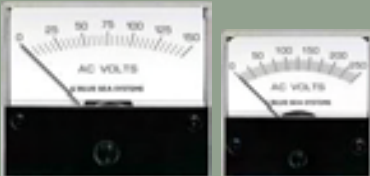

Meters: There are two styles of meter: Analog and digital. There are two sizes of analog meters: standard and compact. Some digital meters have alarms to warn when there is a malfunction. Digital multimeters allow for multiple functions in a single meter.

Meter Accessories: Panels are available to mount meters. There are DC shunts, shunt shifters that allow DC digital ammeters to read positive side shunt applications such as alternator measurement, AC current transformers, digital dimmers from 2 to 20A ratings, and switches.

DC Digital Meters Pages 90-91			
DC Digital Multimeter with Alarm	DC Digital Voltmeter with Alarm	DC Digital Voltmeter	DC Digital Ammeter
			

AC Digital Meters Pages 92-93			
AC Digital Multimeter with Alarm	AC Digital Frequency Meter	AC Digital Ammeter	AC Digital Voltmeter
			

DC Analog Meters Page 94		
DC Analog Voltmeters	DC Analog Ammeters	DC Analog Zero Center Ammeters
		

AC Analog Meters Page 95	
AC Analog Voltmeters	AC Analog Ammeters
	

Meter Accessories Pages 96-97				
Meter Panels	Meter Mounting Panels	DC Shunts	Shunt Shifter	AC Current Transformer
				

DC Digital Multimeter with Alarm

- Displays amperage from -500 to +500 Amperes
- Displays voltage from 0 to 60 Volts DC in 0.01 Volt increments
- High and low voltage, audio and visual alarms
- Standard meter operates in negative side of circuit only. Shunt shifter required for positive side installation such as alternators - reference 8242 (page 97)
- 3 levels of display brightness
- Programmable sleep mode blanks display for power conservation
- Splashproof front
- Includes 500 Amp shunt - reference 8255 (page 97)

Specifications

Input Voltage	7-60V DC*
Minimum Power Consumption	0.60 Watt**
Maximum Power Consumption	1.00 Watt**
Display Character Size	9/16" (14.29mm)
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	1.12Lb (0.51Kg)

* Applicable for 12, 24, 32, 36, and 42 Volt DC systems
 ** Variable with voltage, display intensity, segments illuminated and sleep mode



8248

DC Digital Voltmeter with Alarm

- Displays voltage from 0 to 60 Volts DC
- High and low voltage audio and visual alarms
- 3 levels of display brightness
- Programmable sleep mode blanks display for power conservation
- Splashproof front

Specifications

Input Voltage	7-60V DC*
Minimum Power Consumption	0.60 Watt**
Maximum Power Consumption	1.00 Watt**
Display Character Size	9/16" (14.29mm)
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	0.44Lb (0.20Kg)

* Applicable for 12, 24, 32, 36, and 42 Volt DC systems
 ** Variable with voltage, display intensity, segments illuminated and sleep mode



8251

DC Digital Voltmeter

- Displays voltage from 0 to 60 Volts DC
- 3 levels of display brightness
- Splashproof front
- Manual sleep mode blanks display for power conservation

Specifications

Input Voltage	7-60V DC*
Minimum Power Consumption	0.60 Watt**
Maximum Power Consumption	1.00 Watt**
Display Character Size	9/16" (14.29mm)
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	0.45Lb (0.20Kg)

* Applicable for 12, 24, 32, 36, and 42 Volt DC systems
 ** Variable with voltage, display intensity, segments illuminated and sleep mode



8235



8236

DC Digital Ammeter

- Displays amperage from -500 to +500 Amperes
- 3 levels of display brightness
- Splashproof front
- Manual sleep mode blanks display for power conservation
- Standard meter operates in negative side of circuit only. Shunt shifter required for positive side installation such as alternators - reference 8242 (page 97)
- Includes 500 Ampere shunt - reference 8255 (page 97)

Specifications

Input Voltage	7-60V DC*
Minimum Power Consumption	0.60 Watt**
Maximum Power Consumption	1.00 Watt**
Display Character Size	9/16" (14.29mm)
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	1.05Lb (0.48Kg)

* Applicable for 12, 24, 32, 36, and 42 Volt DC systems

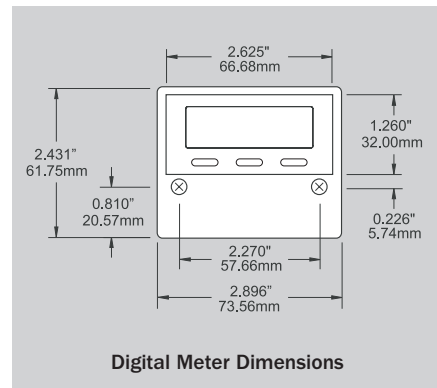
** Variable with voltage, display intensity, segments illuminated and sleep mode

DC Digital Meter Specifications

PN	Description	Current Measurement	Voltage Measurement
8248	DC Digital Multimeter with Alarm	✓	✓
8251	DC Digital Voltmeter with Alarm	-	✓
8235	DC Digital Voltmeter	-	✓
8236	DC Digital Ammeter	✓	-

Current Measurement		Voltage Measurement	
Shunt:	500A-50mV	Range:	0-60V DC
Range:	±500A DC	Resolution:	0.01V DC
Resolution (0.0-99.9):	0.1A DC	Accuracy (% of Reading)	±0.5% ¹
Resolution (100-500):	1.0A DC		
Accuracy (% of Reading):	±0.5% ¹		

¹ ±1 least digit of resolution



Digital Meter Dimensions



8403 with Digital Meter
(page 40-41)



8678 with Digital Meter
(page 41)

AC Digital Multimeter with Alarm

- Displays amperage from 0 to 150 Amperes
- Displays voltage from 80 to 270 Volts AC
- Displays power from 0 to 45 Kilowatts
- Displays frequency from 40 to 90 Hertz
- High and low voltage and high amperage alarms, both audio and visual
- 3 levels of display brightness
- Programmable sleep mode blanks display for power conservation
- Splashproof front
- Includes current transformer - reference 8256, (page 97)

Specifications

Input Voltage	80-270V AC*
Minimum Power Consumption	0.010 Watt**
Maximum Power Consumption	0.027 Watt**
Display Character Size	9/16" (14.29mm)
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	0.78Lb (0.35Kg)

* For 120 & 240 Volt AC single phase systems
 ** Variable with voltage, display intensity, segments illuminated and sleep mode



8247

AC Digital Frequency Meter

- Displays frequency from 40 to 90 Hertz
- 3 levels of display brightness
- Splashproof front
- Manual sleep mode blanks display for power conservation

Specifications

Input Voltage	80-270V AC*
Minimum Power Consumption	0.010 Watt**
Maximum Power Consumption	0.027 Watt**
Display Character Size	9/16" (14.29mm)
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	0.72Lb (0.35Kg)

* For 120 & 240 Volt AC single phase systems
 ** Variable with voltage, display intensity, segments illuminated and sleep mode



8239

AC Digital Ammeter

- Displays amperage from 0 to 150 Amperes
- 3 levels of display brightness
- Splashproof front
- Includes current transformer - reference 8256, (page 97)
- Manual sleep mode blanks display for power conservation

Specifications

Input Voltage	80-270V AC*
Minimum Power Consumption	0.010 Watt**
Maximum Power Consumption	0.027 Watt**
Display Character Size	9/16" (14.29mm)
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	0.78Lb (0.35Kg)

* For 120 & 240 Volt AC single phase systems
 ** Variable with voltage, display intensity, segments illuminated and sleep mode



8238



8237

AC Digital Voltmeter

- Displays voltage from 80 to 270 Volts AC
- 3 levels of display brightness
- Splashproof front
- Manual sleep mode blanks display for power conservation

Specifications

Display Character Size	9/16" (14.29mm)
Input Voltage	80-270V AC*
Minimum Power Consumption	0.010 Watt**
Maximum Power Consumption	0.027 Watt**
Dimensions	Width 2.90" (73.66mm)
	Height 2.43" (61.72mm)
	Depth 3.40" (86.36mm)
Weight	0.72Lb (0.33Kg)

* For 120 & 240 Volt AC single phase systems

** Variable with voltage, display intensity, segments illuminated and sleep mode

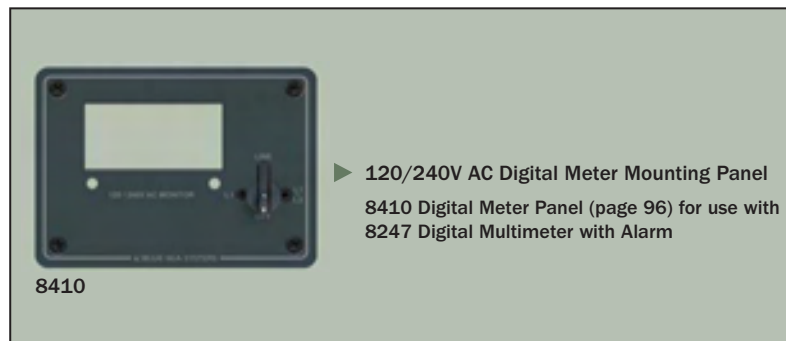
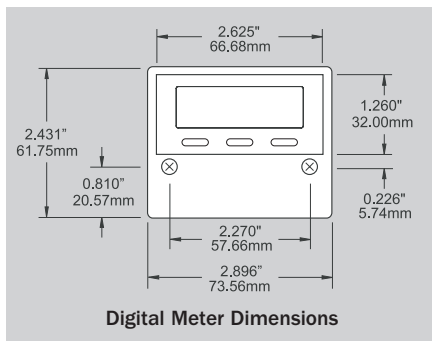
AC Digital Meter Specifications

PN	Description	Current Measurement	Voltage Measurement	Frequency Measurement	Power Measurement
8247	AC Digital Multimeter with Alarm	✓	✓	✓	✓
8239	AC Digital Frequency Meter	-	-	✓	-
8238	AC Digital Ammeter	✓	-	-	-
8237	AC Digital Voltmeter	-	✓	-	-

Current Measurement Current Transformer: 150A-50mV Range 1 (Resolution 0.01A): 0.00-9.99A AC (RMS) Range 2 (Resolution 0.10A): 10-150A AC (RMS) Accuracy (% of Reading): ±1.0% ²	Frequency Measurement Range: 40-90Hz Resolution: 0.1Hz Accuracy (% of Reading): ±1.0% ² (Calibrated with sine wave input)
Voltage Measurement Range: 80-270V AC ¹ Resolution: 0.1V AC Accuracy (% of Reading) 90-270V AC (RMS): ±1.0% ² Accuracy (% of Reading) 80-90V AC (RMS): ±5.0% ²	Power Measurement Range 1 (Resolution 10W): 0.00-9990W Range 2 (Resolution 0.1kW): 10-45kW Accuracy (% of Reading): ±5.0% ²

¹ For 120 & 240 Volt AC single phase systems

² ±1 least digit of resolution



DC Analog Voltmeters

- Simple 2-wire connection to DC positive and negative
- Meter senses and powers from same connection

Specifications

Meter Current 1 Milliampere at full scale
 Accuracy ±2.5% of scale range

Standard Size 2-3/4" Face Meters		
PN	Description	Weight Lb (Kg)
8003	Voltmeter 8-16V DC	0.25 (0.11)
8240	Voltmeter 18-32V DC	0.25 (0.11)
Compact 2" Face Micro Meters		
PN	Description	Weight Lb (Kg)
8028	Micro Voltmeter 8-16V DC	0.19 (0.09)
8243	Micro Voltmeter 18-32V DC	0.19 (0.09)



8240



8028

DC Analog Ammeters

8016, 8017, 8018, 8019, 8022, 8041, and 8250

- Simple 2-wire connection from shunt - no other power required
- Meter senses and powers from shunt connection
- Includes appropriate DC shunt (page 97)

8005 and 8038

- Simple 2-wire connection - no other power required
- Internal shunt

Specifications

External Shunt Type 50 Millivolt at meter full scale
 Meter Current 1 Milliampere at full scale
 Accuracy ±2.5% of scale range

Standard Size 2-3/4" Face Meters			
PN	Description	Shunt Type	Weight Lb (Kg)
8005	Ammeter 0-25A DC	Internal	0.25 (0.11)
8022	Ammeter 0-50A DC + Shunt	External	0.60 (0.27)
8016	Ammeter 0-75A DC + Shunt	External	0.60 (0.27)
8017	Ammeter 0-100A DC + Shunt	External	0.60 (0.27)
8018	Ammeter 0-150A DC + Shunt	External	0.60 (0.27)
8019	Ammeter 0-200A DC + Shunt	External	0.60 (0.27)
Compact 2" Face Micro Meters			
PN	Description	Shunt Type	Weight Lb/Kg
8038	Micro Ammeter 0-15A DC	Internal	0.20 (0.09)
8041	Micro Ammeter 0-50A DC + Shunt	External	0.40 (0.18)
8250	Micro Ammeter 0-100A DC + Shunt	External	0.40 (0.18)



8005



8041

DC Analog Zero Center Ammeters

- Meters read both discharge and charge current
- Simple 2-wire connection from shunt - no other power required
- Meter senses and powers from shunt connection
- Includes appropriate DC shunt (page 97)

Specifications

External Shunt Type 50 Millivolt at meter full scale
 Meter Current 1 Milliampere at full scale
 Accuracy ±2.5% of scale range

Standard Size 2-3/4" Face Meters			
PN	Description	Shunt Type	Weight Lb (Kg)
8252	Ammeter 50-0-50A DC +Shunt	External	0.58 (0.26)
8253	Ammeter 100-0-100A DC +Shunt	External	0.58 (0.26)
Compact 2" Face Micro Meter			
PN	Description	Shunt Type	Weight Lb (Kg)
8254	Ammeter 50-0-50A DC +Shunt	External	0.40 (0.18)



8253



8254



DC Shunts power Blue Sea Systems' DC Ammeters with external shunt (page 97).

9228



9353



8245

AC Analog Voltmeters

- Dial marked in 5 Volt increments
- Simple 2-wire connection to AC hot and neutral
- Meter senses and powers from same connection

Specifications

Accuracy ±2.5% of scale range

Standard Size 2-3/4" Face Meters		
PN	Description	Weight Lb (Kg)
9353	Voltmeter 0-150V AC	0.25 (0.11)
9354	Voltmeter 0-250V AC	0.26 (0.12)

Compact 2" Face Micro Meters		
PN	Description	Weight Lb (Kg)
8244	Micro Voltmeter 0-150V AC	0.19 (0.09)
8245	Micro Voltmeter 0-250V AC	0.19 (0.09)



9630



8246

AC Analog Ammeters

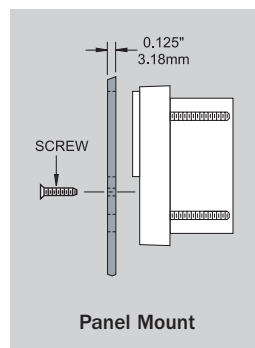
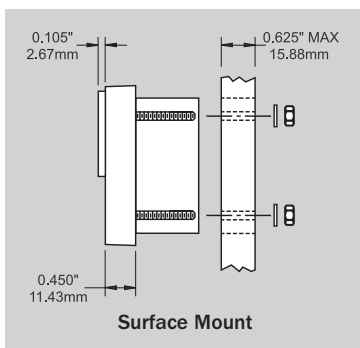
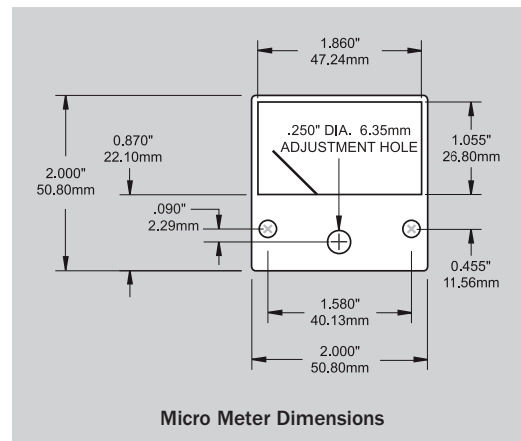
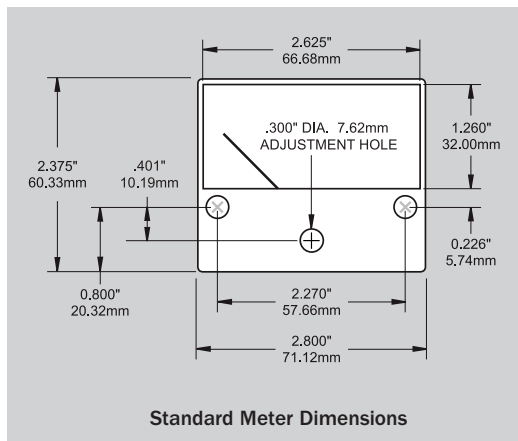
- Simple 2-wire connection
- Meter senses and powers from coil slipped over wire to be measured
- Includes AC current transformer (page 97)

Specifications

Accuracy ±2.5% of scale range
Meter Current 50 Milliampers AC at full scale

Standard Size 2-3/4" Face Meters		
PN	Description	Weight Lb (Kg)
9630	Ammeter 0-50A AC + Transformer	0.30 (0.14)
8258	Ammeter 0-100A AC + Transformer	0.32 (0.15)

Compact 2" Face Micro Meter		
PN	Description	Weight Lb (Kg)
8246	Micro Ammeter 0-50A AC + Transformer	0.26 (0.12)



120/240V AC Digital Meter Panel

- Perfect solution for monitoring 120/240 Volt AC systems
- Monitor Line 1 or Line 2 to Neutral and Line 1 to Line 2 voltages
- Monitor 120 Volt and 240 Volt currents
- Intended for use with 8247 AC Digital Multimeter (Not included) (page 92)
- Includes two additional Current Transformers 8256 (page 97)

Specifications

8247 AC Digital Multimeter See page 92
 Dimensions 5.25" (133.35mm) x 3.75" (95.25mm)

PN	Description
8410	120/240V AC Digital Meter Panel



8410

DC Voltmeter Panel

- 8003 DC Analog Voltmeter (page 94)
- Display voltage from 8-16 Volts DC
- 3 position switch for multiple battery banks
- Full-size 2-3/4" meter

Specifications

Voltage 16 Volts DC Maximum
 Dimensions 5.25" (133.35mm) x 3.75" (95.25mm)

PN	Description	Weight Lb (Kg)
8015	Panel with Analog Voltmeter	0.49 (0.22)



8015

DC Digital Voltmeter Panel

- 8235 DC Digital Meter (page 90)
- 7-60 Volts DC
- 4 digit display
- Full-size 2-3/4" meter

Specifications

Voltage 60 Volts DC Maximum
 Dimensions 5.25" (133.35mm) x 3.75" (95.25mm)

PN	Description	Weight Lb (Kg)
8051	Panel with Digital Voltmeter	0.64 (0.29)



8051

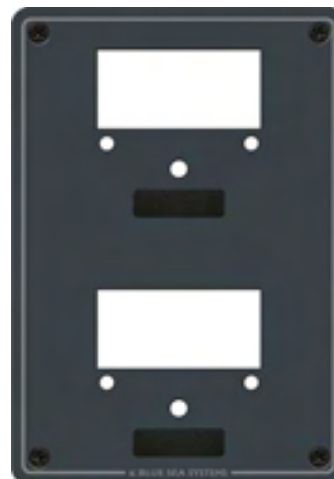
Meter Mounting Panels

- Surface mounts Blue Sea Systems 2-3/4" Analog or Digital Meters

Specifications

Panel Material 0.125" Aluminum 5052 Alloy
 Panel Undercoating Chemical Treatment
 Mil-C-5541C or equivalent
 Panel Front Coating Two part polyurethane slate gray finish
 Dimensions 8013 5.25" (133.35mm) x 3.75" (95.25mm)
 Dimensions 8014 5.25" (133.35mm) x 7.50" (190.50mm)

PN	Description	Weight Lb (Kg)
8013	Mounting Panel For (1) 2-3/4" Meter	0.25 (0.11)
8014	Mounting Panel For (2) 2-3/4" Meters	0.36 (0.16)



8014



8013



8255



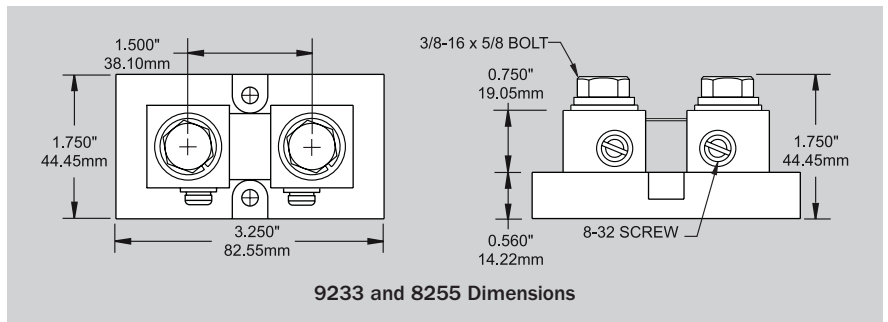
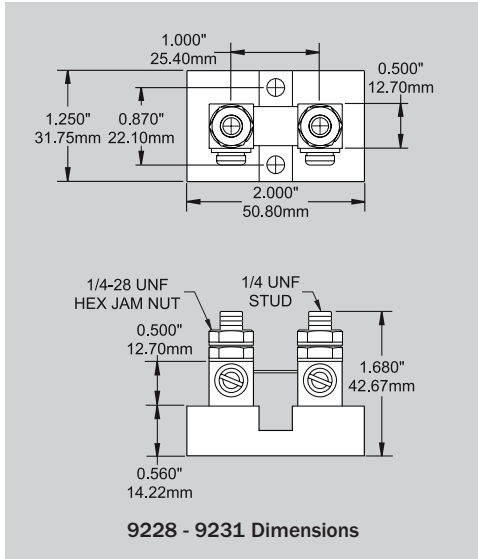
9228

DC Shunts

- For use with DC Ammeters
- For continuous operation, it is recommended that shunts not be run at more than two-thirds (66%) the rated current under normal conditions

Specifications

Shunt Type	Resistive, Manganin Metal Element
Full Scale Resistance	50 Millivolts
Accuracy	±0.25% Rated Current
Continuous Duty	66% of Rated Current
Intermittent Duty	100% - 5 Minutes 300% - 3 Seconds



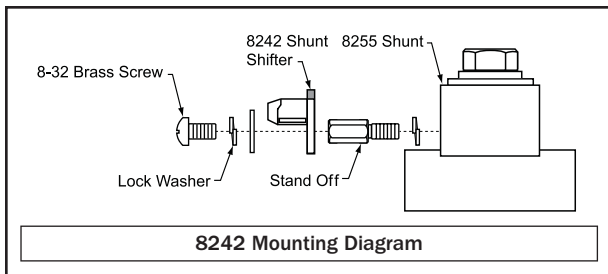
PN	Description	Weight Lb (Kg)
9228	Analog Meter Shunt 50A/50mV	0.20 (0.09)
9229	Analog Meter Shunt 75A/50mV	0.20 (0.09)
9230	Analog Meter Shunt 100A/50mV	0.20 (0.09)
9231	Analog Meter Shunt 150A/50mV	0.20 (0.09)
9233	Analog Meter Shunt 200A/50mV	0.71 (0.32)
8255	Digital Meter Shunt 500A/50mV	0.71 (0.32)



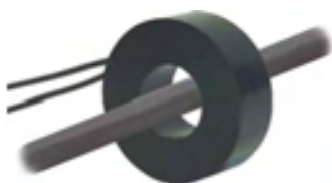
8242

Shunt Shifter

- Shunt adapter for DC Digital Ammeter positive side shunt applications, such as alternator measurement
- The Shunt Shifter is designed for use with Blue Sea Systems 8255 Digital Meter Shunt
- Advanced technology shifts the shunt's positive reference to negative as required by digital meters
- Easily installs directly onto shunt using existing sense screws
- Ideal for use with 12-36 Volt DC systems
- Includes all necessary hardware



PN	Description	Weight Lb (Kg)
8242	Shunt Adapter for DC Digital Ammeter	0.42 (0.02)



8073

AC Current Transformers

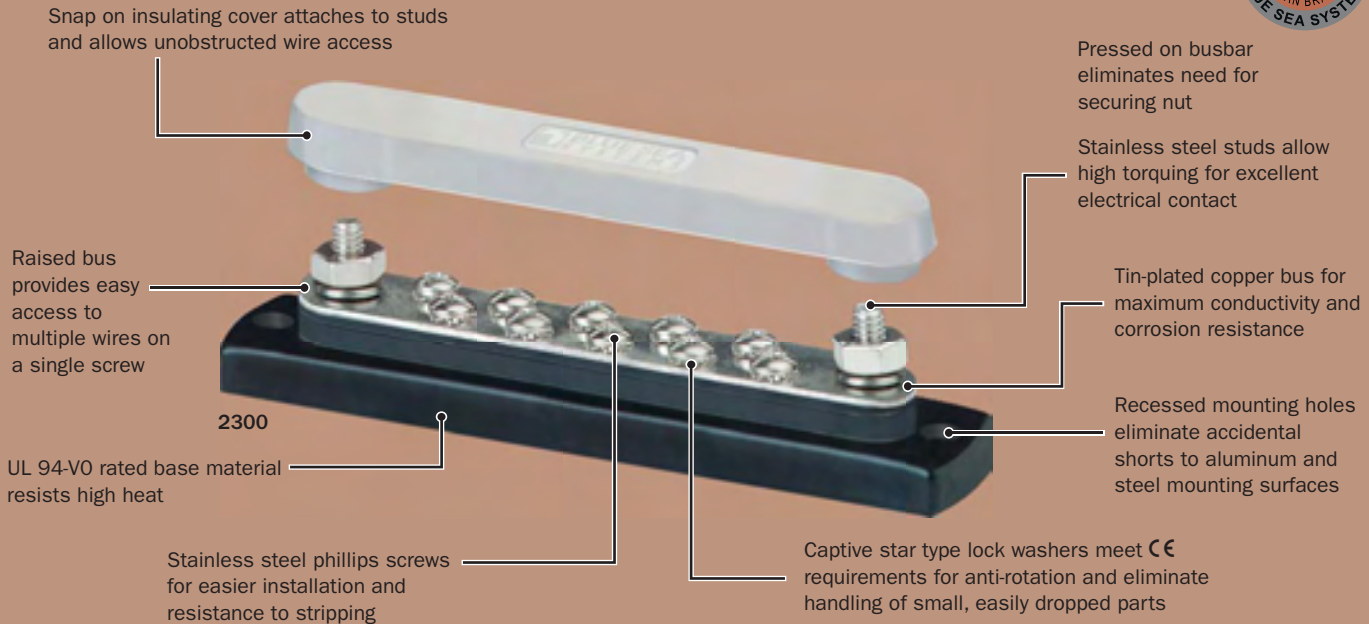
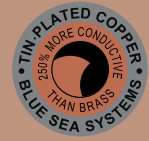
- For use with AC Ammeters

Specifications

Dimensions	0.60" (15.24mm) Inside Diameter 1.38" (35.05mm) Outside Diameter
Accuracy	±1%

PN	Description	Ratio	Weight Lb (Kg)
8073	Analog Ammeter	50A AC/50mA AC	0.10 (0.05)
8257	Analog Ammeter	100A AC/50mA AC	0.20 (0.09)
8256	Digital Ammeter	150A AC/50mA AC	0.20 (0.09)

The Industry Standard for Electrical BusBars



CE Conformance verified for AC circuits up to 250 volts

Busbars, Connectors, and Insulators

Definition

Connectors such as busbars and power posts provide a safe and convenient way to connect circuit wires together, to safely pass them through a surface such as a bulkhead or deck, and to insulate them. Insulators protect electrical connections. US Coast Guard regulations require that continuously energized non-grounded conductors are protected from accidental short circuits and to protect people from shock hazards.

Purpose

On any but the smallest boats, it is impractical to attach all of the wires from each load directly to the battery terminal or the battery switch terminal. For this reason, a positive distribution bus is used to convert the large wire from the batteries to the smaller wires (with individual circuit protection) that carry current out to each load device. Similarly, a negative distribution bus is used to collect all of the small wires from each device and convert them to the large wire from the batteries. Large boats may have many layers of progressively smaller busbars, while small boats may have only a small busbar attached to the back of the electrical distribution panel.

Considerations

When selecting a distribution bus, Blue Sea Systems suggests it have the following qualities:

- Solid copper construction for low voltage drop and low heat rise
- Tin plating to resist corrosion and maintain low resistance connections.
- Stainless steel terminals for strength and corrosion resistance. In a distribution bus, the terminal is a compressive element, not a conductive element. Its purpose is to press the ring terminal against the busbar. This is different from a battery switch in which the terminal's role is to carry current through the terminal and into the interior of the switch.
- Continuous rating equal to or greater than the maximum continuous amperage of the system in which it is installed.

Products in this Section

Blue Sea Systems provides an array of busbars, connectors, and insulators for DC and AC circuit applications.






Busbars: Busbars are available at current ratings from 100 to 600A. They are available with stud terminals for large cable connections, and screw terminals for small terminal connections. Insulating covers are available for most busbars.


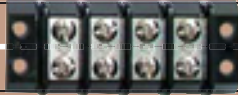

Terminal Blocks: Terminal blocks are available with current ratings from 20 to 65A, with 2 to 12 circuits.

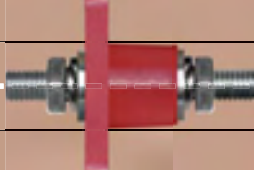



Feed-Through Connectors: Feed-through connectors are available with current ratings of 250 and 400A. They allow high currents to be passed through hull, deck, or bulkhead. They eliminate chafing and provide strain relief.



PowerPosts: PowerPosts are used to connect high-amperage cables. Some PowerPosts are not current rated because current flows between terminals stacked on the post. The PowerPost Plus allows small wire connections at high-amperage cable connections.

Cable Clams and Cable Caps: Use cable clams for secure, water-tight through-deck cable installations. Use cable-cap stud insulators for any terminal stud connection that should be protected.

BusBars Pages 100-104				
Common BusBars 100 Amperes	DualBus Plus Common BusBars 150 Amperes	Common BusBars 150 Amperes	MaxiBus 250 Amperes	PowerBar 600 Amperes
				
				
				
0				
300				
600				

Terminal Blocks Pages 104-106		
Terminal Blocks 20 Amperes	Terminal Blocks 30 Amperes	Terminal Blocks 65 Amperes
		
		
		
0		
20		
40		
60		

Feedthrough Connectors and PowerPosts Pages 106-107			
PowerPost Plus Cable Connectors 150 Amperes	Terminal Feedthrough Connectors 250 Amperes	Terminal Feedthrough Connectors 400 Amperes	PowerPost High Amperage Cable Connectors
			
			
			
0			
200			
400			

CableClams and CableCaps Pages 108-109	
CableClam	CableCaps
	

MiniBus 100 Ampere Common BusBars

- Great for limited space applications



Specifications

Continuous Amperage	100 Amperes AC/DC
Maximum Voltage Rating	300 Volts AC/48 Volts DC
Bus Material	Tin-Plated Copper CDA 110/UNS11000
Base Material	Reinforced Polycarbonate
Cover Material	Clear Polycarbonate

Certifications

- CE marked

PN	Description	Weight Lb (Kg)
2304	5 x 8-32 Screw Terminal	0.15 (0.07)
2314	5 x 8-32 Screw Terminal with Cover	0.17 (0.08)
2305	4 x 10-32 Stud Terminal	0.15 (0.07)
2315	4 x 10-32 Stud Terminal with Cover	0.17 (0.08)
2306	Grounding BusBar 6 x 8-32 Screw Terminal	0.10 (0.05)
2713	Cover For MiniBus 2304 and 2305	0.05 (0.02)

NEW PRODUCT **UPDATED PRODUCT** New and updated products will be available in the Spring of 2007



2304 CE



2314 CE



2305 CE



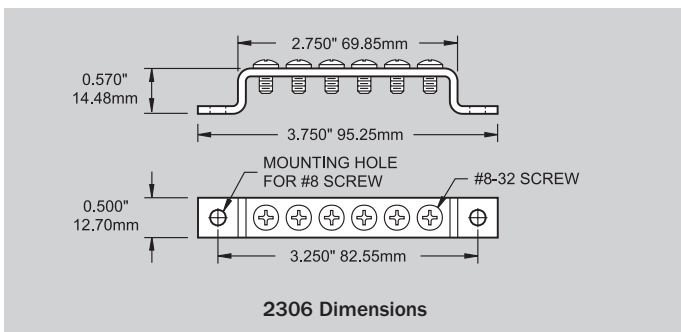
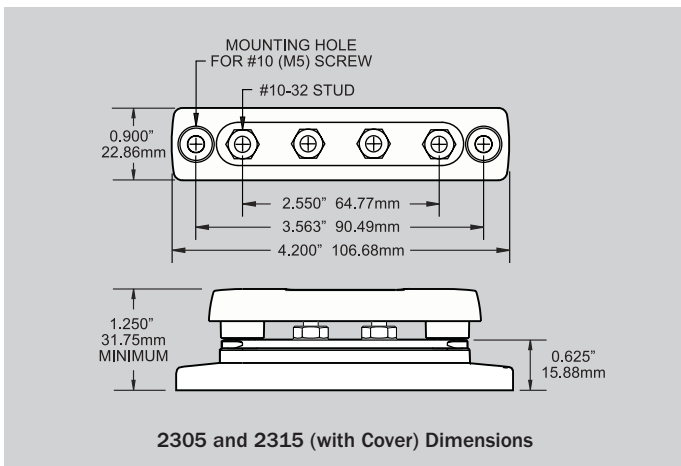
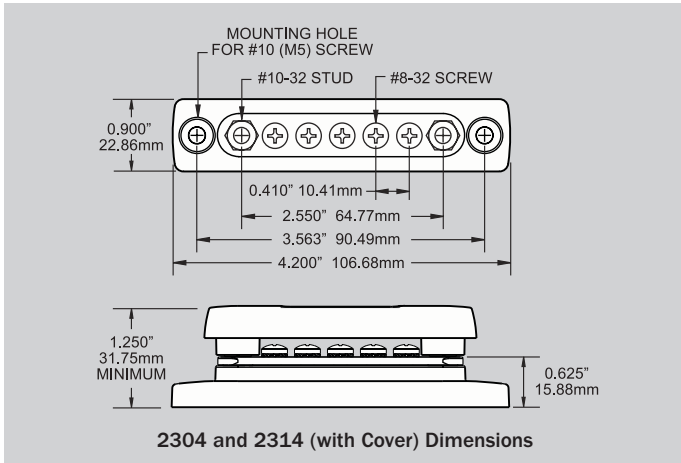
2315 CE



2713



2306





DualBus 100 Ampere Common BusBars

- Combines negative and positive buses on one block

Specifications

Continuous Amperage	100 Amperes AC/DC
Maximum Voltage Rating	300 Volts AC/48 Volts DC
Bus Material	Tin-Plated Copper CDA 110/UNS11000
Base Material	ABS
Cover Material	ABS

Certifications

- CE marked

PN	Description	Weight Lb (Kg)
2701	5 x 8-32 Screw Terminal	0.20 (0.09)
2702	10 x 8-32 Screw Terminal	0.30 (0.14)
2709	Cover For DualBus 2701	0.05 (0.02)
2710	Cover For DualBus 2702	0.05 (0.02)



2701



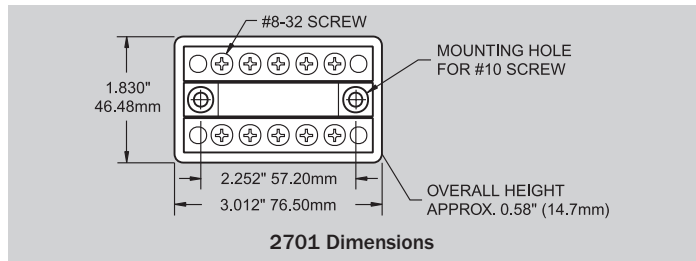
2702



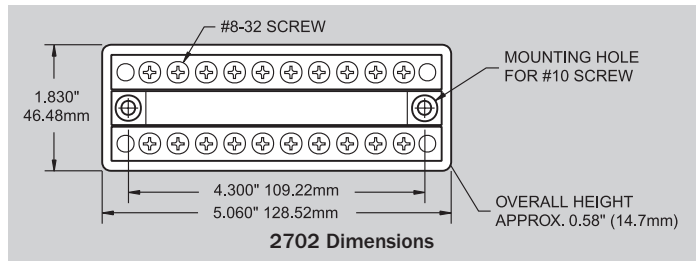
2709



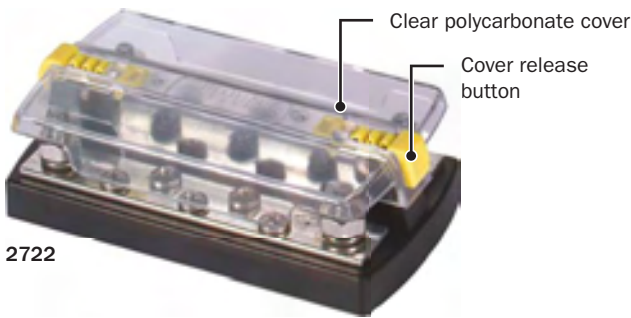
2710



2701 Dimensions



2702 Dimensions



2722

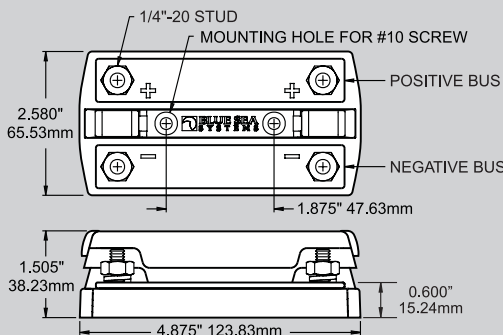
DualBus Plus 150 Ampere Common BusBars

- Combines negative and positive buses on one block
- Clear polycarbonate cover snaps on to meet Coast Guard and ABYC insulation requirements

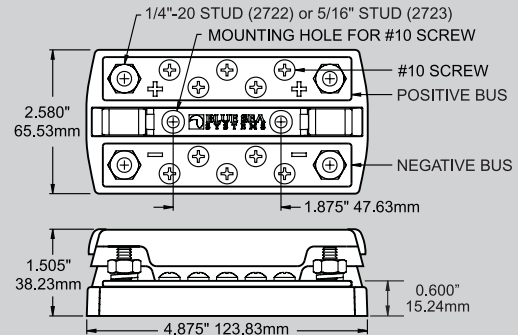
Specifications

Continuous Amperage	130 Amperes AC/150 Amperes DC
Maximum Voltage Rating	300 Volts AC/48 Volts DC
Bus Material	Tin-Plated Copper CDA 110/UNS11000
Base Material	Reinforced Polycarbonate
Cover Material	Clear Polycarbonate

PN	Description	Weight Lb (Kg)
2720	1/4" Stud	0.61 (0.28)
2722	1/4" Stud, 5 x 10-32 Screw Terminal	0.66 (0.30)
2723	5/16" Stud, 5 x 10-32 Screw Terminal	0.61 (0.28)



2720 Dimensions



2722 and 2723 Dimensions

150 Ampere Common BusBars

- The industry standard busbar for positive distribution
- The industry standard busbar for the collection of negative or AC ground circuits



Specifications

Continuous Amperage	130 Amperes AC/150 Amperes DC
Maximum Voltage Rating	300 Volts AC/48 Volts DC
Bus Material	Tin-Plated Copper CDA 110/UNS11000
Base Material	Reinforced Polycarbonate
Cover Material	Clear Polycarbonate

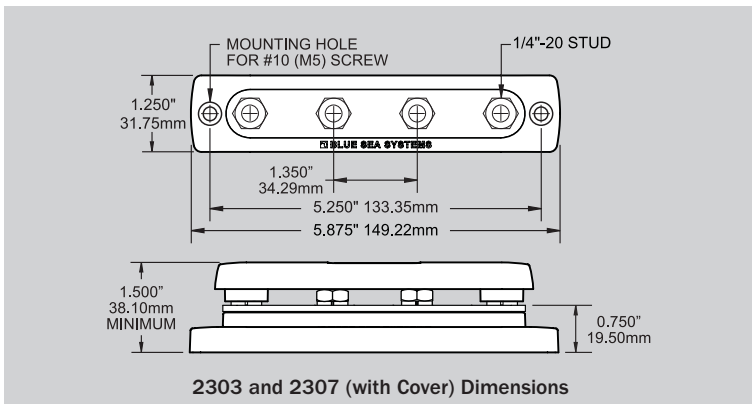
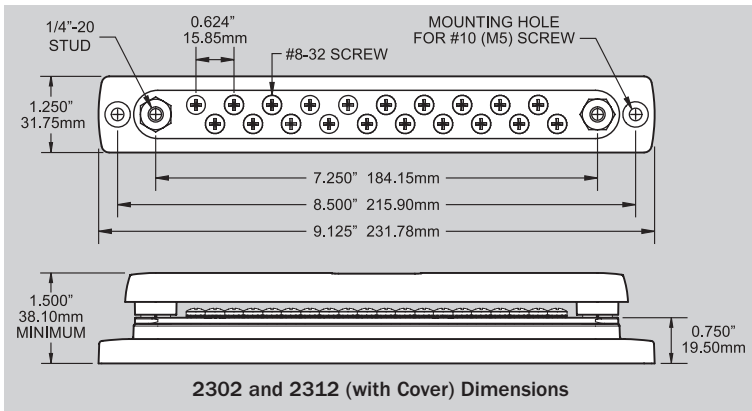
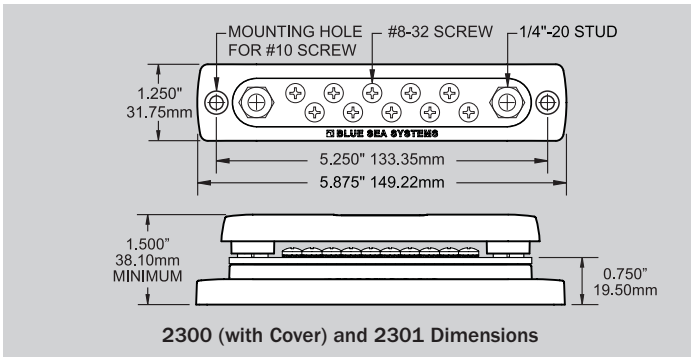
Certifications

- CE marked

PN	Description	Weight Lb (Kg)
2301	10 x 8-32 Screw Terminal	0.34 (0.15)
2300	10 x 8-32 Screw Terminal with Cover	0.37 (0.16)
2302	20 x 8-32 Screw Terminal	0.53 (0.24)
2312	20 x 8-32 Screw Terminal with Cover	0.58 (0.26)
2303	4 x 1/4" Stud Terminal	0.35 (0.16)
2307	4 x 1/4" Stud Terminal with Cover	0.38 (0.17)
2715	Cover For BusBar 2301 and 2303	0.07 (0.03)
2716	Cover For BusBar 2302	0.13 (0.06)

NEW PRODUCT **UPDATED PRODUCT** **New and updated products will be available in the Spring of 2007**

Note: 2715 replaces 2706 / 2716 replaces 2707





MaxiBus 250 Ampere Common BusBars

Specifications

Continuous Amperage	250 Amperes AC/DC
Maximum Voltage Rating	300 Volts AC/48 Volts DC
Bus Material	Tin-Plated Copper CDA 110/UNS11000
Base Material	Reinforced Polycarbonate
Cover Material	ABS

Certifications

• CE marked



2105

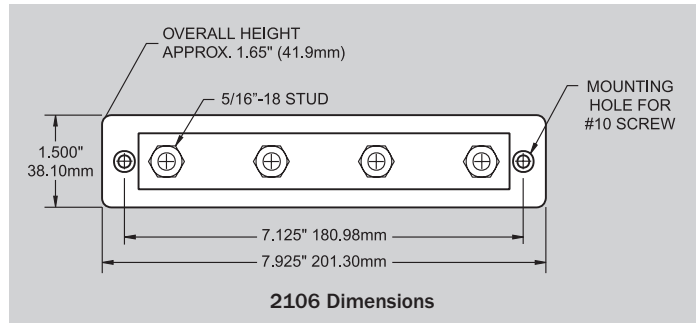
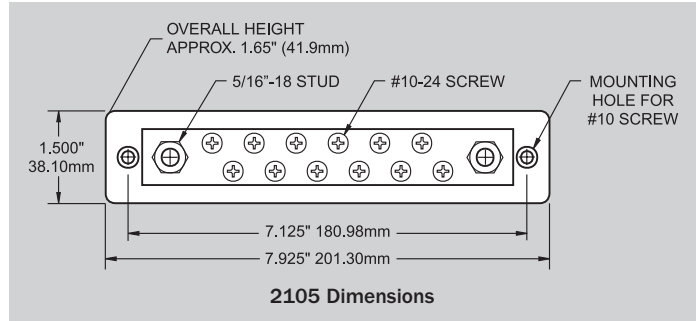


2106



2711

PN	Description	Weight Lb (Kg)
2105	12 x #10-32 Terminal Screws	0.80 (0.36)
2106	4 x 5/16" Stud Terminals	0.90 (0.41)
2711	Cover For MaxiBus 2105 and 2106	0.06 (0.03)



Squalicum Harbor - Bellingham, Washington

PowerBar 600 Ampere Common BusBars



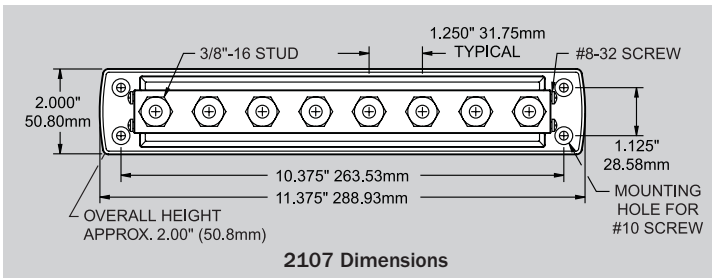
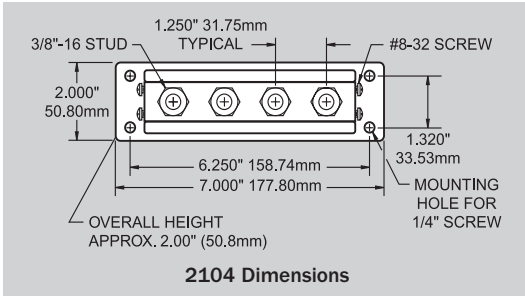
Specifications

Continuous Amperage	545 Amperes AC/600 Amperes DC
Maximum Voltage Rating	300 Volts AC/48 Volts DC
Bus Material	Tin-Plated Copper CDA 110/UNS11000
Base Material	Reinforced Polycarbonate
Cover Material	ABS

Certifications

- CE marked

PN	Description	Weight Lb (Kg)
2104	4 x 3/8-16 Stud Terminal	1.75 (0.79)
2107	8 x 3/8-16 Stud Terminal	2.75 (1.25)
2708	Cover For 2104	0.25 (0.11)



2104



2107



2708

20 Ampere Terminal Blocks

- Closed back design completely insulates power from the mounting surface
- Each screw pair is 1 isolated circuit
- Jumpers allow creation of common circuits (9218 - see page 106)

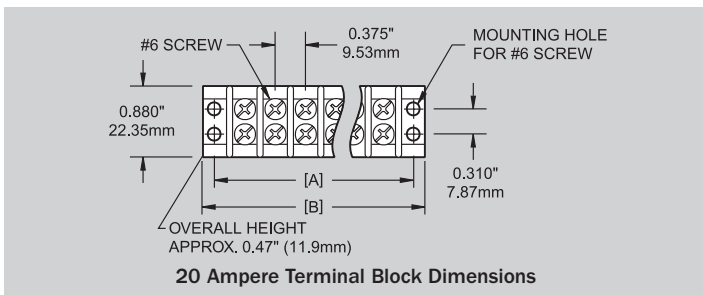
Specifications

Continuous Rating	20 Amperes AC/DC
Maximum Voltage Rating	300 Volts AC/DC
Bus Material	Nickel-Plated Brass
Base Material	Nylon
Screw Size	#6

Certifications

- CE marked

PN	Circuit	Weight Lb (Kg)	[A] in" (mm)	[B] Length in" (mm)
2402	2	0.05 (0.02)	1.13 (28.70)	1.41 (35.81)
2404	4	0.06 (0.03)	1.88 (47.75)	2.16 (54.86)
2406	6	0.08 (0.04)	2.63 (66.80)	2.91 (73.91)
2408	8	0.10 (0.05)	3.38 (85.85)	3.66 (92.96)
2410	10	0.11 (0.05)	4.13 (104.90)	4.41 (112.01)



2402



2404



2406



2408



2410

30 Ampere Terminal Blocks

- Closed back design completely insulates power from the mounting surface
- Each screw pair is 1 isolated circuit
- Jumpers allow creation of common circuits (9217 - see page 106)

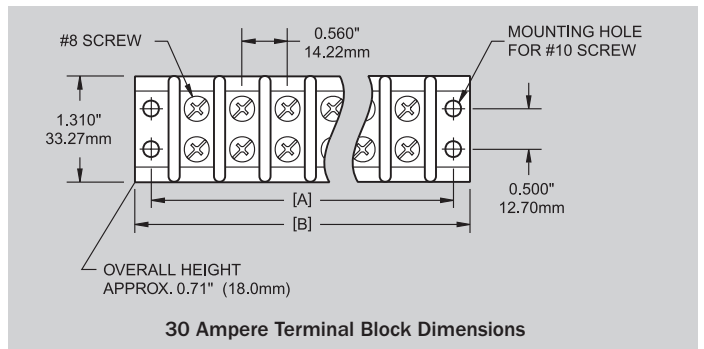
Specifications

Continuous Rating 30 Amperes AC/DC
 Maximum Voltage Rating 600 Volts AC/DC Maximum
 Bus Material Nickel-Plated Brass
 Base Material Phenolic
 Screw Size #8

Certifications

- CE marked

PN	Circuit	Weight Lb (Kg)	[A] in" (mm)	[B] Length in" (mm)
2502	2	0.11 (0.05)	1.69 (42.93)	2.10 (53.34)
2504	4	0.15 (0.07)	2.81 (71.37)	3.22 (87.79)
2506	6	0.21 (0.10)	3.93 (99.82)	4.34 (110.24)
2508	8	0.27 (0.12)	5.05 (128.27)	5.46 (138.68)
2510	10	0.33 (0.15)	6.17 (156.72)	6.58 (167.13)
2512	12	0.35 (0.16)	7.29 (185.17)	7.70 (195.58)



65 Ampere Terminal Blocks

- Closed back design completely insulates power from the mounting surface
- Each screw pair is 1 isolated circuit
- Jumpers allow creation of common circuits (9216 - see page 106)

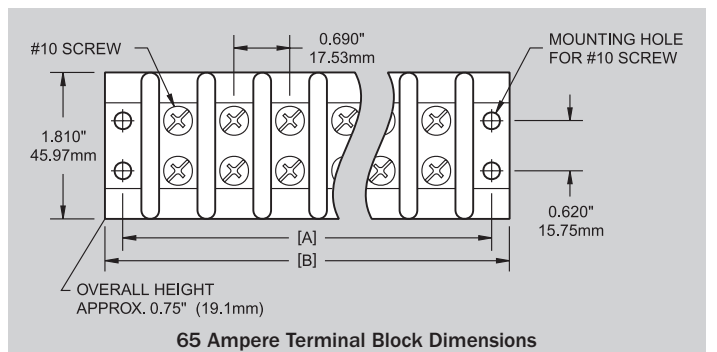
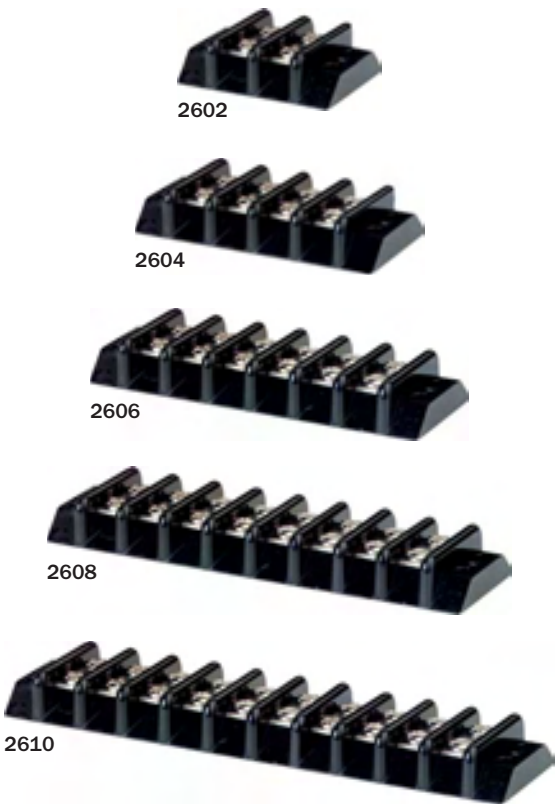
Specifications

Continuous Rating 65 Amperes AC/DC
 Maximum Voltage Rating 600 Volts AC/DC
 Bus Material Nickel-Plated Brass
 Base Material Phenolic
 Screw Size #10

Certifications

- CE marked

PN	Circuit	Weight Lb (Kg)	[A] in" (mm)	[B] Length in" (mm)
2602	2	0.15 (0.07)	2.06 (52.32)	2.50 (63.49)
2604	4	0.25 (0.11)	3.44 (87.38)	3.88 (98.55)
2606	6	0.34 (0.16)	4.82 (122.43)	5.26 (133.61)
2608	8	0.43 (0.20)	6.20 (157.48)	6.64 (168.67)
2610	10	0.52 (0.24)	7.58 (192.53)	8.02 (203.73)



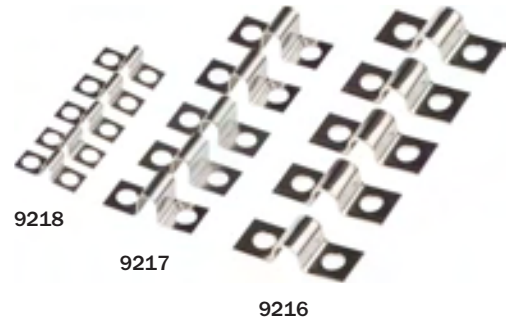
Terminal Block Jumpers

- Jumpers allow creation of common circuits on independent connectors
- **9218** - Fits 20 Ampere terminal blocks (2400 Series)
- **9217** - Fits 30 Ampere terminal blocks (2500 Series)
- **9216** - Fits 65 Ampere terminal blocks (2600 Series)

Specifications

Bus Material Nickel-Plated Brass
 Continuous Amperage Equivalent to matching block

PN	Description	Weight Lb (Kg)
9218	Terminal Block Jumpers for 2400 Series	0.03 (0.01)
9217	Terminal Block Jumpers for 2500 Series	0.04 (0.02)
9216	Terminal Block Jumpers for 2600 Series	0.05 (0.03)



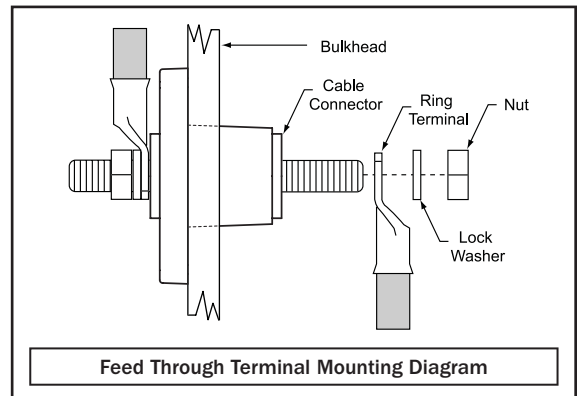
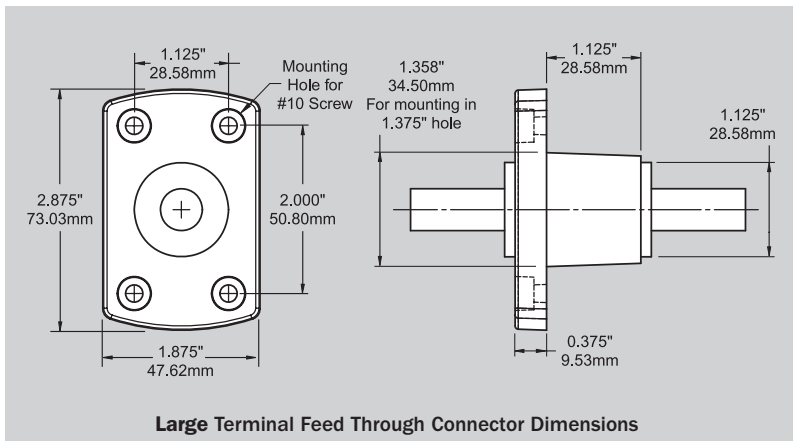
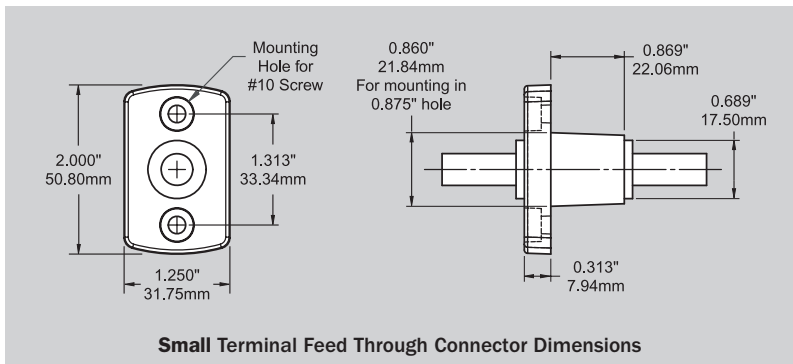
Terminal Feed Through Connectors

Perfect for passing high current through hulls, decks and bulkheads. Large cables passed through holes are subject to chafing even when protective grommets is used. Terminal Feed Through Connectors eliminate chafing and provide excellent strain relief for the cables. The large terminals have a mounting face that can be gasketed or bedded to provide a water tight installation.

Specifications

Maximum Voltage Rating 48 Volts DC Maximum
 Base Material Reinforced Thermoplastic
 Stud Material Tin-Plated Copper Alloy

PN	Size	Description	Continuous Amperage	Color	Weight Lb (Kg)
2201	Small	5/16"-18 Stud	250A	Black	0.30 (0.14)
2202	Small	5/16"-18 Stud	250A	Red	0.30 (0.14)
2203	Small	3/8"-16 Stud	250A	Black	0.30 (0.14)
2204	Small	3/8"-16 Stud	250A	Red	0.30 (0.14)
2205	Large	3/8"-16 Stud	400A	Black	0.62 (0.28)
2206	Large	3/8"-16 Stud	400A	Red	0.62 (0.28)
2207	Large	1/2"-13 Stud	400A	Black	0.62 (0.28)
2208	Large	1/2"-13 Stud	400A	Red	0.62 (0.28)



PowerPost High Amperage Cable Connectors

- Connects high amperage cables securely

Specifications

Continuous Amperage	Not rated - Amperage flows between terminals stacked on post and is determined by wire and terminals used.
Maximum Voltage Rating	48 Volts DC
Base Material	Reinforced Thermoplastic

Certifications

- CE marked

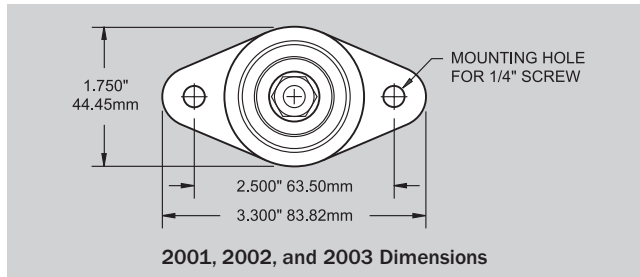
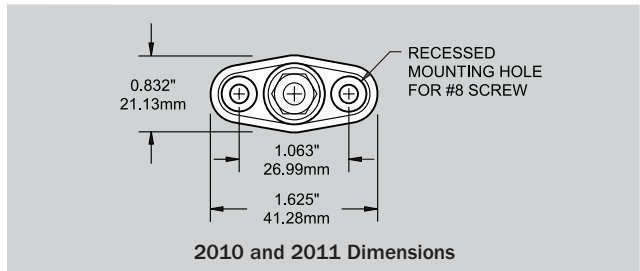


2010



2003

PN	Description	Weight Lb (Kg)
2010	#10-32 x 5/8" stud	0.06 (0.03)
2011	1/4" x 3/4" Stud	0.10 (0.05)
2001	1/4" x 1-1/16" Stud	0.20 (0.09)
2002	5/16" x 7/8" Stud	0.25 (0.11)
2003	3/8" x 7/8" Stud	0.27 (0.12)



PowerPost Plus Cable Connectors

- 150 Ampere bus allows small wire connections at high amperage cable connections

Specifications

Bus Continuous Amperage	150 Amperes AC/DC
Voltage Rating	48 Volts DC Maximum
Bus Material	Tin-Plated Copper
Base Material	Reinforced Thermoplastic

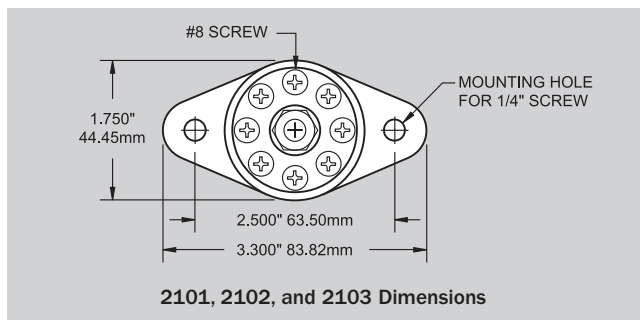
Certifications

- CE marked



2103

PN	Description	Weight Lb (Kg)
2101	1/4" x 1" Stud	0.29 (0.13)
2102	5/16" x 3/4" Stud	0.30 (0.14)
2103	3/8" x 3/4" Stud	0.34 (0.15)



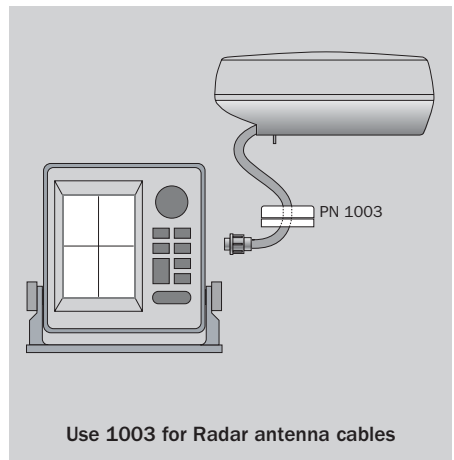
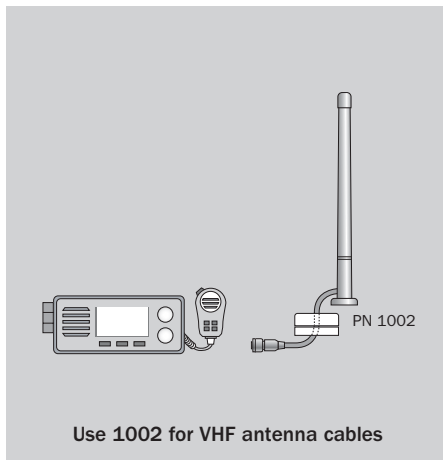
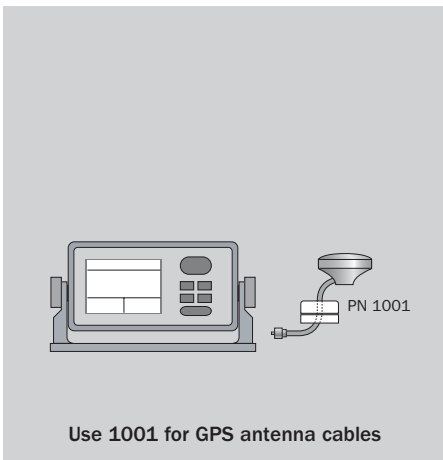
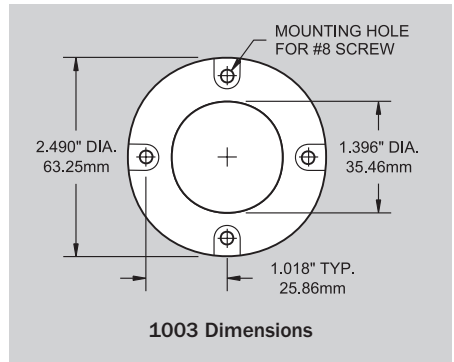
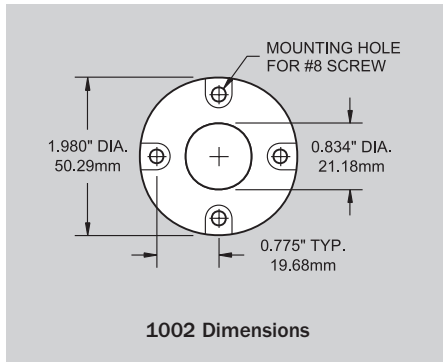
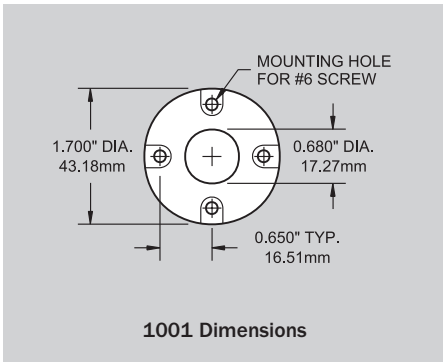
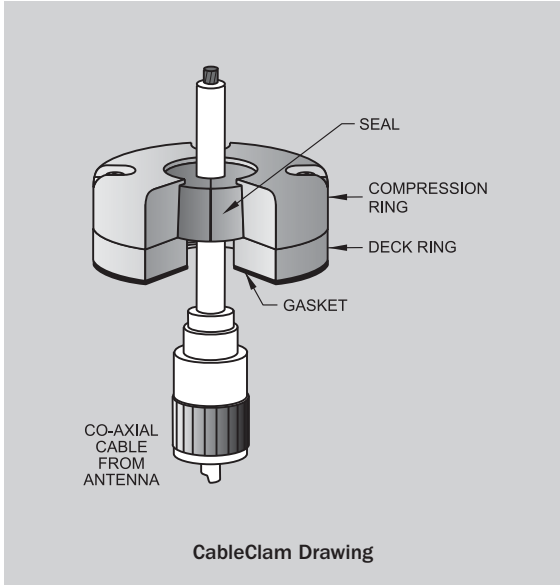
CableClams

- Perfect for antenna installation
- Waterproof co-axial installation without removing connectors
- Save the expense of removing and replacing connectors
- Avoid poor connections from removing factory connectors

Specifications

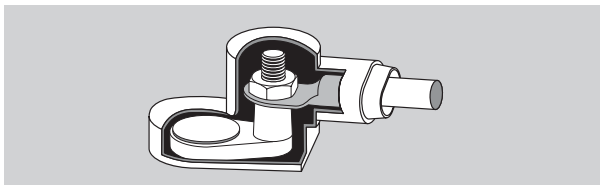
Body Material Acetal
 Seal Material UV-Stabilized Buna-N Rubber
 Screws Stainless Steel

PN	Connector Opening in" (mm)	Weight Lb (Kg)
1001	0.63 (15.87)	0.15 (0.07)
1002	0.83 (20.95)	0.20 (0.09)
1003	1.39 (35.18)	0.30 (0.14)





4001



Rotating CableCaps

- Top rotates 360 degrees to allow cable entry from any angle
- For batteries with integral marine wing nut posts

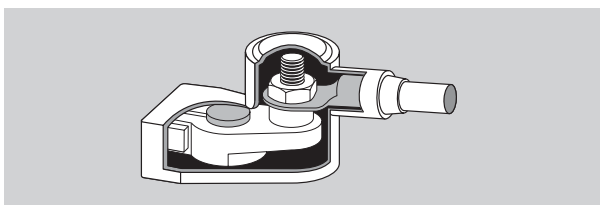
Specifications

Material PVC

PN	Cable Size	Color	Package	Weight Lb (Kg)
4001	All	Red/Black	Retail/Pair	0.25 (0.11)
9030	All	Black	Bulk	0.10 (0.45)
9031	All	Red	Bulk	0.10 (0.45)



4005



Standard CableCaps

- For batteries with marine adapter terminals added on

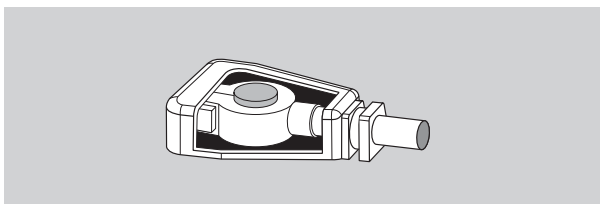
Specifications

Material PVC

PN	Cable Size	Color	Package	Weight Lb (Kg)
4005	4, 2, 1	Red/Black	Retail/Pair	0.22 (0.10)
4006	1/0, 2/0	Red/Black	Retail/Pair	0.22 (0.10)
9038	4, 2, 1	Black	Bulk	0.07 (0.03)
9039	4, 2, 1	Red	Bulk	0.07 (0.03)
9040	1/0, 2/0	Black	Bulk	0.07 (0.03)
9041	1/0, 2/0	Red	Bulk	0.07 (0.03)



4016



Automotive CableCaps

- Designed to fit standard automotive posts

Specifications

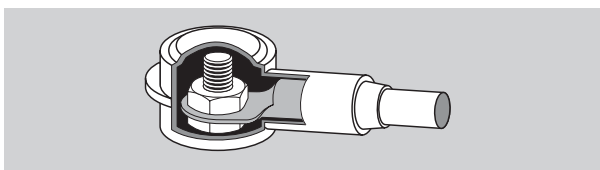
Material PVC

PN	Cable Size	Color	Package	Weight Lb (Kg)
4016	4, 2, 1	Red/Black	Retail	0.18 (0.08)
4017	1/0, 2/0	Red/Black	Retail	0.18 (0.08)
9176	1/0, 2/0	Red	Bulk	0.07 (0.03)
9177	1/0, 2/0	Black	Bulk	0.07 (0.03)



4009

4008



CableCap Stud Insulators

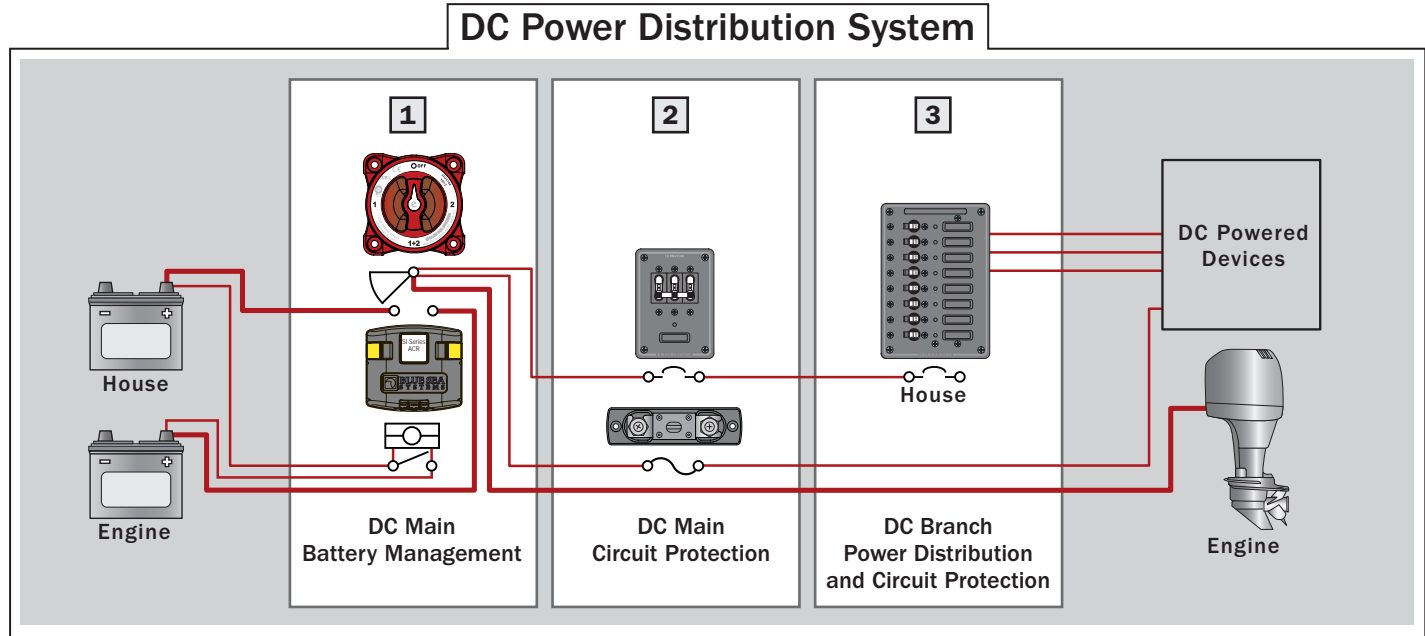
- Insulate stud type connectors on alternators, starters, windlasses and other high amperage devices

Specifications

Material PVC

PN	Cable Size	Color	Package	Weight Lb (Kg)
4008	18-10	Red	Retail/3	0.05 (0.02)
4009	18-10	Black	Retail/3	0.05 (0.02)
4010	8-4	Red	Retail/2	0.05 (0.02)
4011	8-4	Black	Retail/2	0.05 (0.02)
4012	2-2/0	Red	Retail/1	0.07 (0.03)
4013	2-2/0	Black	Retail/1	0.07 (0.03)
4014	3/0-4/0	Red	Retail/1	0.07 (0.03)
4015	3/0-4/0	Black	Retail/1	0.07 (0.03)

The DC Main Power Distribution System conducts power from the battery banks to the beginning of the DC Branch Distribution System. The three elements of the DC Power Distribution System are illustrated below:



1 DC Main Battery Management

DC Main Battery Management is made up of two product categories, Battery Switches and Charge Management, which are covered separately in this section.

Battery Switches

Purpose

To isolate the potentially destructive energy in the battery banks when the boat is not in use or in emergencies.

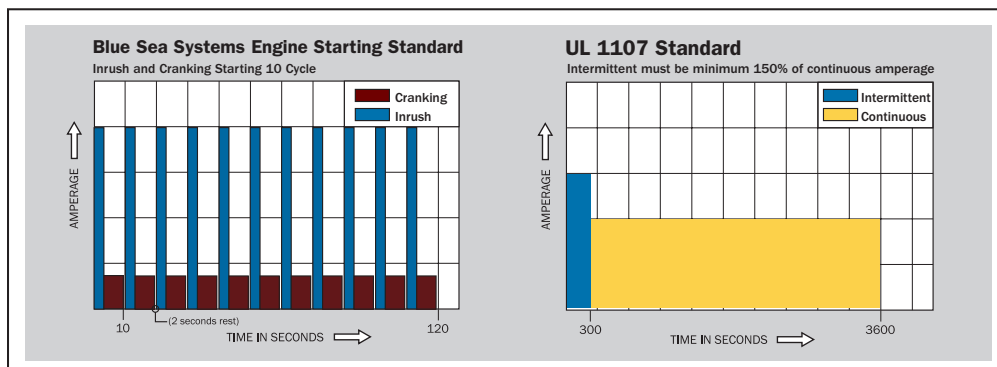
ABYC 11.7.1.2.1. A battery switch shall be installed in the positive conductor(s) from each battery or battery bank with a CCA rating greater than 800 Amperes.

Considerations

Historically there have been two types of battery switches used on boats; Single Circuit and Battery Selector Switches. In 2006, Blue Sea Systems introduced a third option called a DUAL CIRCUIT PLUS™ Battery Switch as a better alternative.

Selecting a Battery Switch. Any battery switch used in a marine application should be UL Listed to UL Standard 1107 or should be tested to this standard by a Nationally Recognized Testing Laboratory, of which UL is only one of many. In particular, any amperage rating other than those determined by UL 1107, or a standard whose details are publicly stated by the manufacturer, should be treated with skepticism. The CE mark is not a substitution for the UL 1107 Listing as the CE mark covers only the Ignition Protection aspect of the battery switch and does not specify amperage ratings or the many other functional requirements of UL 1107.

Battery Switch Ratings. The UL standard for marine battery switches is UL Standard 1107. This standard rates switches only for 5 minute and 1 hour time periods. Clearly, these ratings are not useful for the boater using a switch in the engine starting circuit where current durations may be 10 seconds or less. For this reason, Blue Sea Systems has created an additional standard called the **Engine Starting Standard**. The **Engine Starting Standard** is 10 cycles - each consisting of an Inrush Current spike of 1/4 second duration, a Cranking period of 9-3/4 seconds duration, and a 2 second rest period - for a total of 120 seconds. This is representative of the load imposed on a battery switch in the starting circuit under very difficult starting conditions. Blue Sea Systems' battery switches, in addition to being tested to UL 1107, are also tested to the **Engine Starting Standard** by a United States Coast Guard certified Nationally Recognized Testing Laboratory.



When determining the proper size battery switch, consult your engine manufacturer for the amperage requirements of your engine starter motor. If this information is not available from the engine manufacturer you may refer to the following rule of thumb used by mechanics to roughly estimate the cranking requirement of various type and sizes of engines.

Estimating starter motor amperage draw to determine size of battery switch

Gasoline engines - 1 amp/cubic inch of engine displacement = cranking rating

Diesel engines - 2 amps/cubic inch of engine displacement = cranking rating

These values are intended to be general estimates and do not apply to gear reduction starter motors. Sherman, Ed, *Power Boaters Guide to Electrical Systems*, 2000

ABYC Requirements

11.7.1.2.3. *Battery Switch Ratings* – The intermittent rating of a battery switch shall not be less than the maximum cranking current of the largest engine cranking motor that it serves. The minimum continuous rating of a battery switch shall be the total of the ampacities of the main overcurrent protection devices connected to the battery switch, or the ampacity of the feeder cable to the switch, whichever is less.

ABYC Standards for battery switches are currently under review by the ABYC Project Technical Committee for battery switches. The two major changes likely to be made are that allowable temperature rise will decrease, thereby lowering the amperage ratings that switches currently carry, and the Engine Starting Standard developed by Blue Sea Systems will be incorporated into the standard.

Charge Management

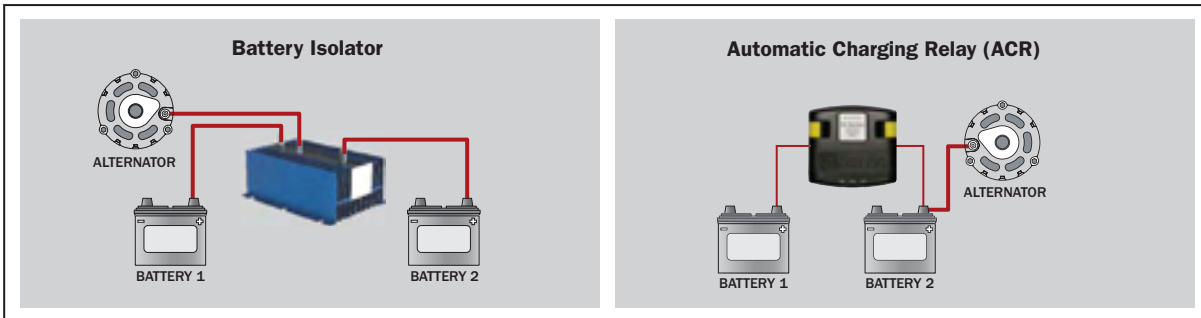
Purpose

In multiple battery bank systems, Charge Management Devices (CMD's) provide a means of combining two battery banks when charging, while keeping the battery banks isolated from each other when the charging source is not charging. This assures that even if one battery bank is depleted there will always be a charged battery bank available for engine starting. Some devices can also provide a means of connecting both battery banks together for additional power while starting engines. There are many types of CMD's that fulfill this role; the two main categories are Battery Isolators and Automatic Charge Relays (ACR's).

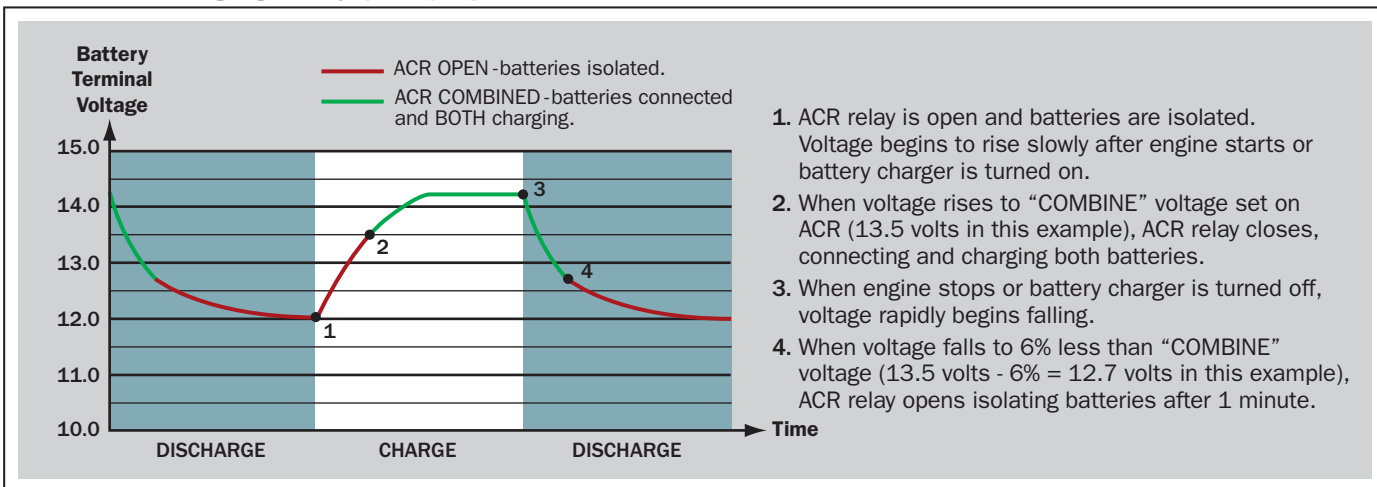
Considerations

Battery Isolators. A common method of distributing charging current to multiple battery banks while assuring that they remain electrically isolated during discharge. These devices are electrical “one way check valves” that allow current flow to, but not from, the battery. Their disadvantage is that the diodes used to achieve this cause a voltage drop that consumes charging energy, creates heat, and causes batteries to be undercharged. Alternators with external voltage sensing can correct for the undercharging problem, but voltage drop and the heat generated remain a problem.

Automatic Charging Relays (ACR's). The popular method for achieving the same goal as isolators, but they work on a different principle. Instead of using diodes to block current from flowing in both directions, ACR's use mechanical relays combined with a circuit that senses when a charging source is being applied to either battery. When a charge is being applied, the ACR closes; and when the circuit senses that the charge is no longer present, the ACR opens after a short time delay which assures that the ACR does not open during temporary voltage sags due to load start-ups. The most common method of determining that a charge is being applied to the system is to sense voltages in the region above 12.6 Volts DC.



Automatic Charging Relay (ACR) Operation



Considerations when Selecting an Automatic Charging Relay

Current Management. Automatic Charging Relays (ACR's) can potentially be exposed to very high currents if the engine is cranked while the ACR is closed, paralleling the battery banks. This can occur when an alternate charge source causes the ACR to close. Blue Sea Systems uses three methods for dealing with this. The CL-Series BatteryLink™ ACR has automatic current management circuits, the L-Series ACR has high amperage contacts rated for engine starting and Blue Sea Systems' new SI-Series ACR momentarily opens the relay, isolating the two batteries during a starting event.

Over Voltage Adjustability. This allows the ACR to be used between different type battery banks in which one battery bank requires lower maximum charging voltages than the other battery bank.

Combining and Disconnecting Voltage Adjustability. This allows the voltage at which the ACR closes and its associated cut-out voltage to be adjusted for the specific requirements of each boat's electrical system.

Manual Override. This allows the ACR to be manually opened, set to automatic, or manually combined from a remote location.

2 and 3 DC Main Circuit Protection and Branch Circuit Protection

Purpose

Fuses and circuit breakers are used to protect wire insulation from melting and starting fires in the event of over currents or short circuits which cause more amperage to flow in a wire than that wire is rated to handle. It is important to note that, except for those wires that are intended to carry starting currents, every positive wire in the DC Main Power Distribution System must be protected by a fuse or circuit breaker.

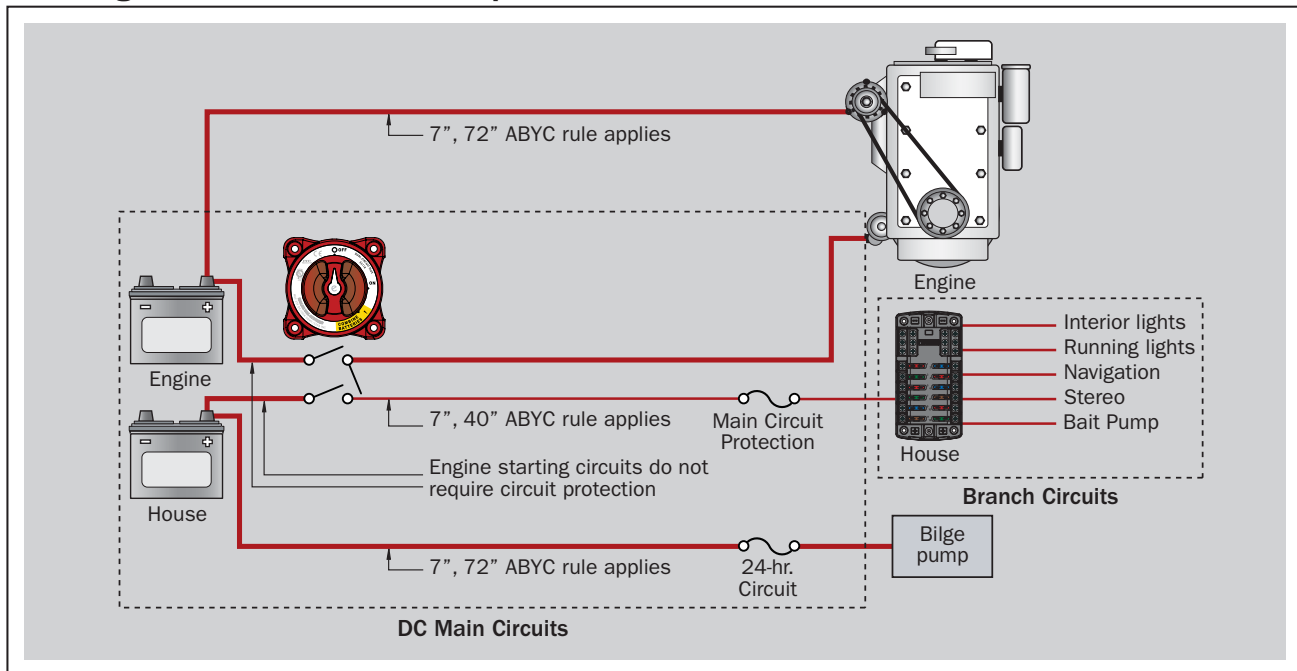
Considerations for DC Main Circuit Protection

Mounting Placement -distance from power source. The DC Main circuit protection system uses circuit breakers or fuses to protect the wires of the DC main distribution system. The American Boat and Yacht Council (ABYC) publishes voluntary standards for the type and placement of the fuse or circuit breaker to be used as a DC main circuit protection device.

The diagram below shows the required placement of main circuit protection devices. Note that wire intended to carry engine starting currents between the batteries, the switch and the starter, is not required to have main circuit protection devices installed.




Mounting placement dimensions for a fuse or circuit breaker: 7" if the conductor is not housed in a sheath or enclosure in addition to the wire insulation, 40" if the conductor is housed in a sheath or enclosure in addition to the wire insulation, 72" if the conductor is connected directly to the battery and housed in a sheath or enclosure in addition to the wire insulation

Mounting Placement -distance from power source



Selecting DC Main Circuit Protection. DC Main Circuit Protection Devices are characterized by one principal attribute, their Ampere Interrupt Capacity (AIC) rating. Specifications listed in the ABYC standards determine the AIC a Main Circuit Protection Device must have. The total Cold Cranking Amperes (CCA) of the batteries installed that can be connected to the circuit to be protected determine the required AIC rating. See the tables below for the required AIC ratings.

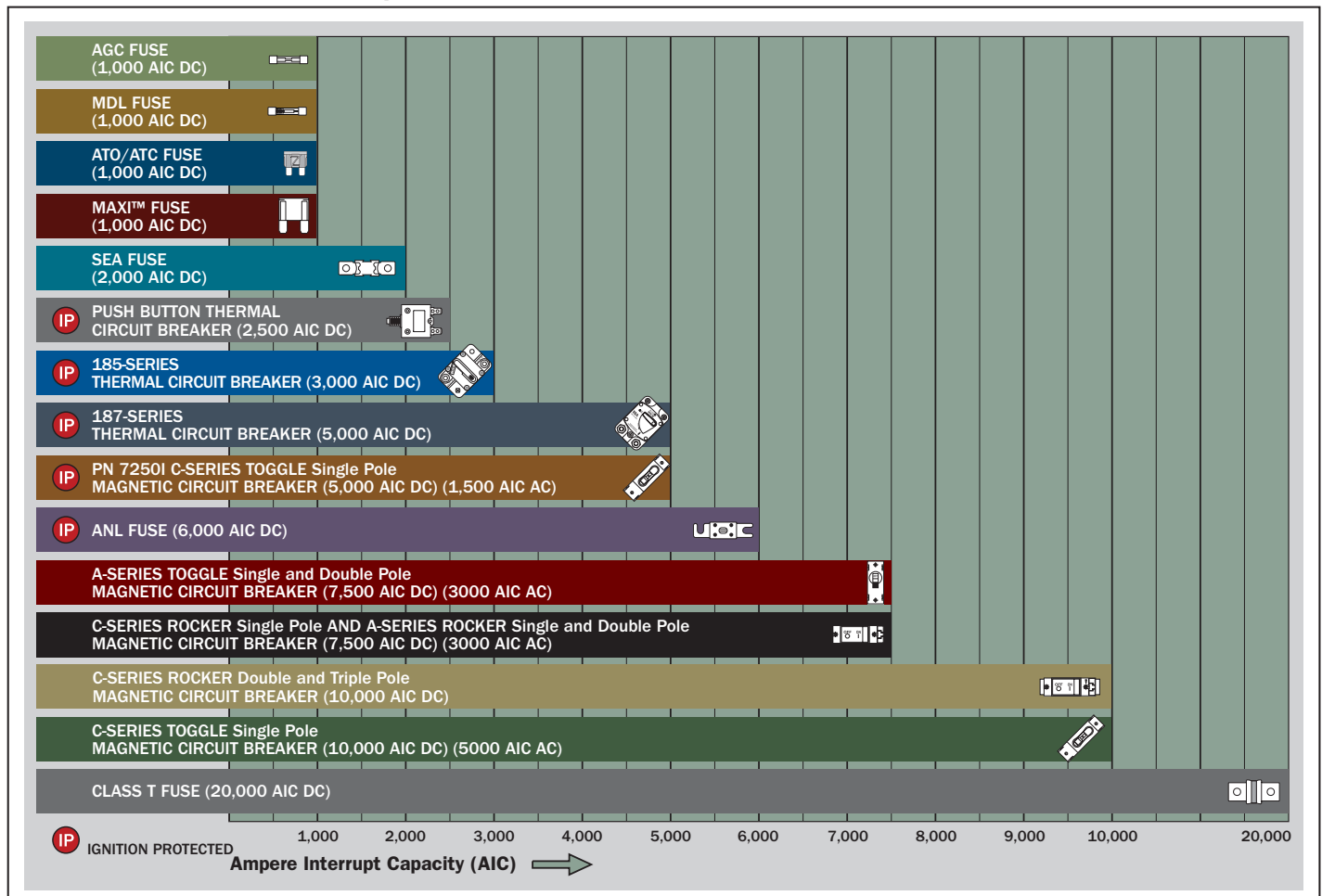
ABYC Interrupt Rating Table

Total Connected Battery Cold Cranking Amperes (CCA) *	Ampere Interrupt Capacity	
12 VOLTS AND 24 VOLTS		
The white boxes identify two batteries, of the same size, placed in parallel configuration.	DC MAIN	DC BRANCH
 650 CCA or Less	1,500 AIC	750 AIC
 651-1,100 CCA	3,000 AIC	1,500 AIC
 Over 1,100 CCA	5,000 AIC	2,500 AIC
32 VOLTS		
1,250 CCA or Less	3,000 AIC	1,500 AIC
Over 1,250 CCA	5,000 AIC	2,500 AIC

* Battery cold cranking performance rating at -17.8°C (0°F) - The discharge load in amperes that a battery at -17.8°C (0°F) can deliver for 30 seconds, and maintain a voltage of 1.2 Volts per cell or higher. eg. 7.2 Volts for a 12 Volt battery. The CCA for the battery icons above is an approximation and could be slightly higher or lower. Consult the battery manufacturers specifications for precise CCA ratings.

ABYC standard E-11 requires that only circuit breakers be applied according to the above table and requires that the circuit breaker can be reset and reusable. The standard does not strictly require that fuses be applied in the same way, but it is an issue to consider, especially with high amperage fuses used to protect panel feeders or inverters. Fuses under 10 Ampere rating generally have such a high internal resistance they prevent fault currents from reaching 1000 Amperes in 12 Volt circuits. The apparent contradiction when using these fuses for bilge pumps and other circuits directly off the battery is less an issue than it might seem. If a fuse blows, and the case appears to be cracked or metal has been ejected, the fuse holder should be replaced.

Circuit Protection Device Comparison Table



Considerations for General Circuit Protection

Ignition Protection. ABYC E-11.5.1.3 and US Coast Guard regulations require that electrical sources of ignition located in spaces containing gasoline powered machinery, gasoline fuel tanks, locations where fumes from gasoline or LP gas fumes can accumulate, comply with standards for ignition protection. To be ignition protected, these devices must have any spark producing mechanisms sealed and low enough surface temperatures that they will not ignite gas fumes. Even diesel powered vessels have suffered major fires and explosions as a result of fumes from dinghy fuel or stored painting supplies. Switches, circuit breakers, and fuses are all considered to be potential sources of ignition. Many of the circuit protection devices offered by Blue Sea Systems comply with ignition protection standards and are identified on the Circuit Protection Device Comparison Table on page 113 with an **IP** icon.

Selecting a Fuse or Circuit Breaker. If the application requires the circuit protection device to be in an explosive area, including gasoline engine rooms or other areas susceptible to gasoline fumes, battery compartments, or propane lockers then an ignition protected circuit breaker or fuse is required.

1) Fuse or circuit breaker?

Fuse advantages: Available in higher amperage ratings, higher interrupt ratings, greater size ranges and generally lower cost

Circuit breaker advantages: Can be reset after opening, can be used as a switch, available in vaporproof or waterproof models, a wide range of opening speed characteristics are available

2) What Interrupt Rating or Ampere Interrupt Capacity (AIC) is required?

See the ABYC Interrupt Rating Table on page 113. Limit the selection to a fuse or circuit breaker type that meets the AIC of each.

3) What type of circuit protection device meets the AIC rating requirements from question 2?

See the Circuit Protection Device Comparison Table on page 113.

4) Does the circuit protection device need to be ignition protected?

See the **IP** icon on the Circuit Protection Device Comparison Table on page 113.

5) What should the appropriate amperage rating be for the circuit protection device?

- The rating must be lower than the ampacity of the smallest wire in the circuit. See the ABYC Ampacity Rating Table below.
- The rating must be higher than the maximum continuous current that will flow in the circuit.

* Special considerations should be made for electrical systems that exceed 32 Volts

** There are other issues that may be considered by reading ABYC E-11.12 circuit protection

ABYC Ampacity* Rating Table

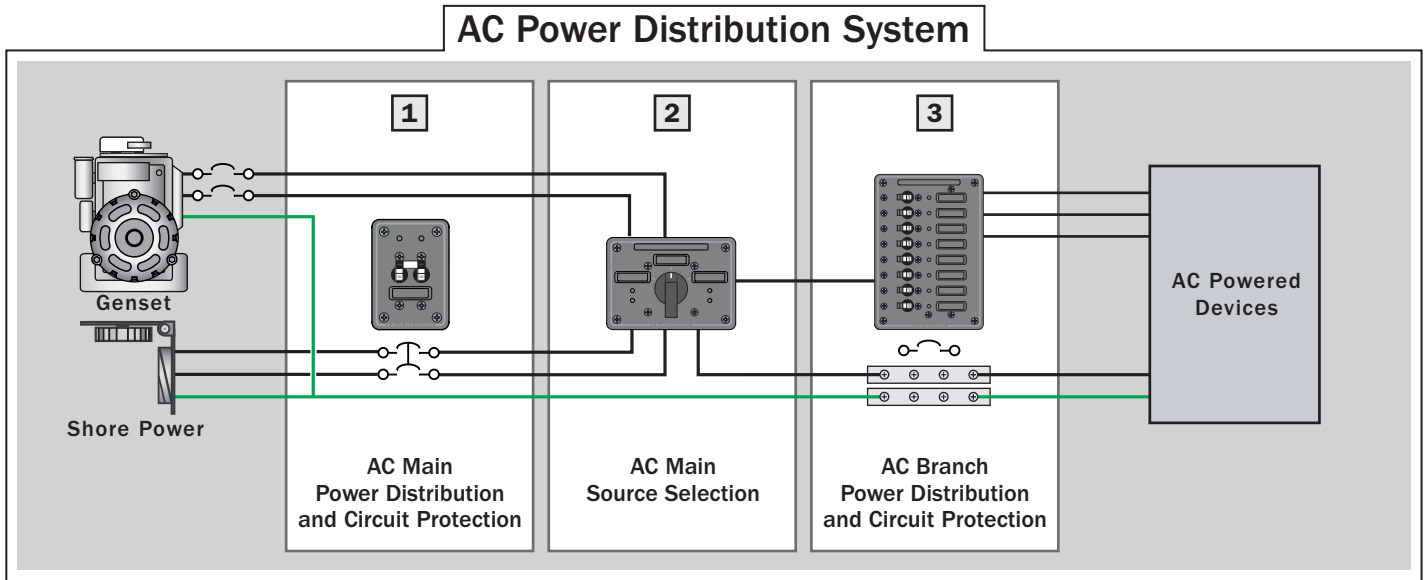
Allowable amperage for conductors under 50 Volts							Reference Data			
AWG Wire Size	Temperature Rating of Conductor Insulation						Metric (Sq mm)	AWG CM Area	SAE CM Area	Ohms /1000ft
	75°C (167°F)		90°C (194°F)		105°C (221°F)					
	Outside	Inside	Outside	Inside	Outside	Inside				
18	10	7.5	20	16.4	20	17	0.8	1,600	1,537	6.385
16	15	11.3	25	20.5	25	21.3	1	2,600	2,336	4.016
14	20	15	30	24.6	35	29.8	2	4,100	3,702	2.525
12	25	18.8	40	32.8	45	38.3	3	6,500	5,833	1.588
10	40	30	55	45.1	60	51	5	10,500	9,343	0.9989
8	65	48.8	70	57.4	80	68	8	16,800	14,810	0.6282
6	95	71.3	100	82	120	102	13	26,600	24,538	0.3951
4	125	93.8	135	110	160	136	19	42,000	37,360	0.2485
2	170	127	180	147	210	178	32	66,500	62,450	0.1563
1	195	146	210	172	245	208	40	83,690	77,790	0.1239
0	230	172	245	200	285	242	50	105,600	98,980	0.09827
2/0	265	198	285	233	330	280	62	133,100	125,100	0.07793
3/0	310	232	330	270	385	327	81	167,800	158,600	0.06180
4/0	380	270	385	315	445	378	103	211,600	205,500	0.04901

* Thermally limited amperage capacity

Wire selection for DC applications on boats is usually based on voltage drop requirements. However, there is a maximum continuous current that the wire can withstand without overheating. Higher grade marine wires are rated for service up to 105°C (221°F)—the ABYC wire capacity table for 105°C is most frequently quoted. The 105°C table accurately reflects the capacity of single conductors exposed to freely circulating cooling air. However, other factors, such as covering bundles of wire in outer jackets to form a cable, or use of conduits or structural voids to protect wires, can reduce the cooling and reduce the safe capacity of the wire.

A more conservative strategy is to use the 105°C wire, but treat it according to the 75°C table above when selecting circuit protection unless the wire is openly exposed for cooling.

The AC Main Power Distribution System begins at the sources of AC power (Shore Power, Genset, or Inverter). It ends at the Line terminal connection of the AC branch circuit breaker for the Hot wire and at the branch circuit connection block for the Neutral and Safety ground wires.



1 AC Main Power Distribution and Circuit Protection

Purpose

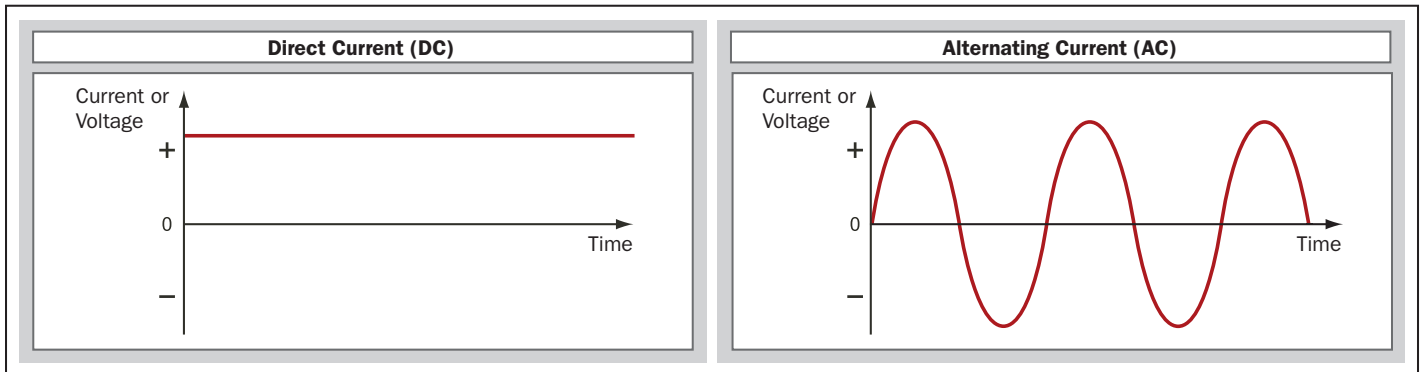
- Provide a path for delivering power from the ship's sources of AC power to the AC branch distribution system
- Provide a path for returning fault currents to ground via the green safety ground wire
- Provide galvanic Isolation in the green safety ground wire
- Provide a means for disconnecting AC power when the boat is not in use or in emergencies
- Provide electrical separation to insure that two sources of AC power are never connected
- Provide circuit protection for neutral and line wires in the AC main system
- Provide ground fault protection (See RCD in Glossary page 124) in European Systems

Considerations

Due to the nature of alternating current, the devices used to distribute AC power are frequently the same as the devices that perform AC circuit protection. Before selecting components for an AC system, several important distinctions about AC power must be considered.

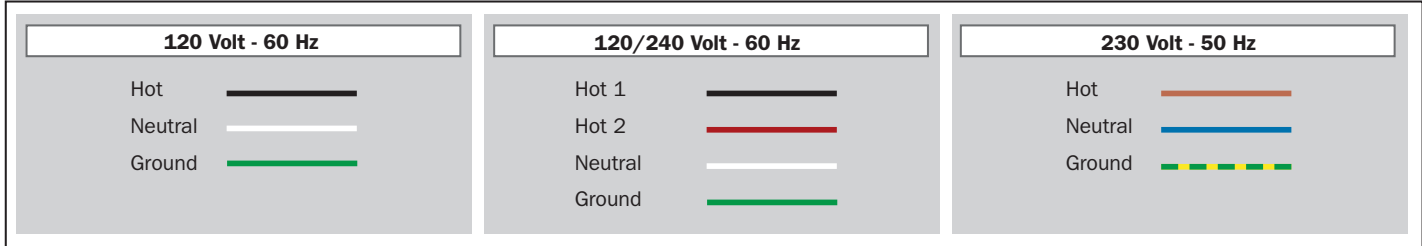
Direct Current (DC) vs. Alternating Current (AC). In DC systems, current flow is in one direction - from the point of higher voltage (electrical pressure) to lower voltage. In AC systems, the voltage reverses 60 times each second (50 times each second in Europe and other parts of the world), called "cycles" or "Hertz" (Hz). This voltage reversal also reverses the current flow and gives this type of power its name - Alternating Current (AC). Because of this alternating current and the higher voltages it uses, (120 and 240 Volts AC vs. 12 or 24 Volts DC) the wiring configurations and components for AC current are different than DC.

Direct Current vs. Alternating Current



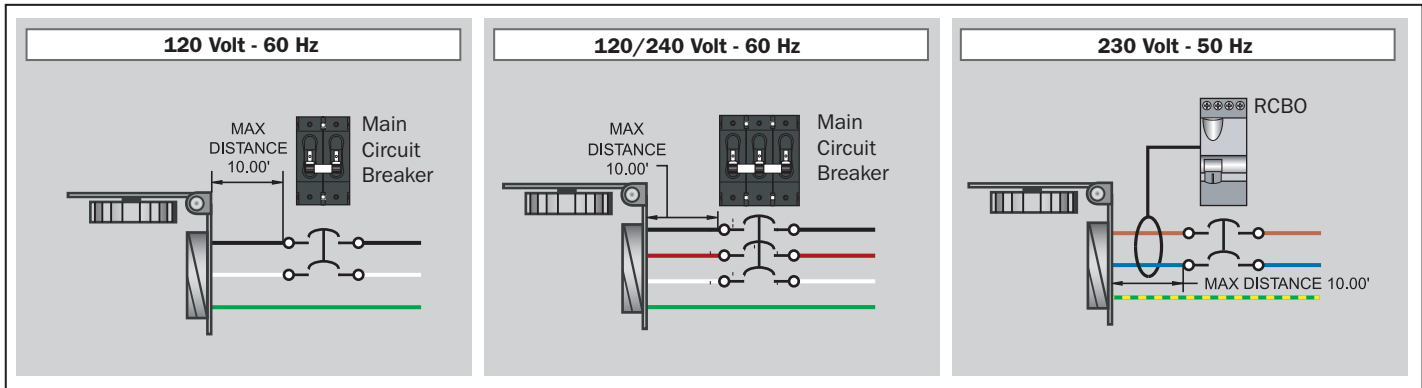
AC Wire Systems. The three most common AC systems used on boats are shown below. In all cases the ground, sometimes called safety ground to clarify its purpose and differentiate it from the DC ground or negative, is said to be a “normally non-current carrying wire”. Its purpose is to provide the lowest resistance path for AC currents that have strayed from their proper containment in the normally current carrying hot and neutral wires. The ground wire is connected to the exterior conductive parts of AC devices that could be touched by a person during normal operation and conducts errant AC currents safely to ground rather than passing them through a human body. The ground wire is never passed through a switch or circuit breaker.

AC Wire Systems



Physical Configurations of AC Main Circuit Breakers. Sources of AC power, whether shore power or on board generators and inverters, should always have a circuit breaker near the power source. This circuit breaker is designated the AC main circuit breaker. The AC main circuit breaker should always have a pole for each of the hot and neutral wires in the circuit assuring that circuit protection functions are not compromised in reverse polarity (page 124) situations. Therefore 120 Volt systems use a double pole main circuit breaker. Although not required by the ABYC Standards, three pole circuit breakers with the Neutral connected through the third pole are sometimes used on 120/240 Volt systems. In cases where the main circuit breaker is also used for source selection the Neutral must be switched to maintain the correct Neutral connection.

Physical Configurations of AC Main Circuit Breakers



Devices Qualifying as AC Main Circuit Breakers

In order to qualify as an AC main circuit breaker four primary characteristics must be present:

- 1) The circuit breaker must have an Ampere Interrupt Rating (AIC) meeting those requirements of the table below:
- 2) The circuit breaker must be multiple pole, usually 2 or 3 (see “AC Wire Systems” above).
- 3) The circuit breaker must be rated for the appropriate AC system voltage in which it will be used.
- 4) The circuit breaker must be available in amperages appropriate to the design amperage of the system.

In the USA, this is generally 30 and 50 Amperes, while European systems are generally 16 and 32 Amperes.

European systems also require that a Residual Current Device (RCD) (page 124) be installed on the entire AC system and this is generally implemented as Residual Current Breaker Overcurrent (RCBO) (page 124) device which incorporates a double pole circuit breaker and an RCD into a single device.

ABYC Interrupt Rating Table

AC Shore Power Source	Main Circuit Breaker	Branch Circuit Breaker
120V - 30A	3,000	3,000
120V - 50A	3,000	3,000
120/240V - 50A	5,000	3,000
240V - 50A	5,000	3,000

2 AC Main Source Selection

Purpose

AC sources from shore power, generator sets, inverters, and isolation transformers must be switched in such a way that ensures only one AC source is connected and all other AC sources are completely disconnected. Hazards to personnel and damage to equipment can occur if sources are improperly connected to each other. A properly designed selector system will allow only the appropriate neutral and hot source conductors to connect to the load without allowing the system to supply power backwards to unused connections or sources.

Considerations

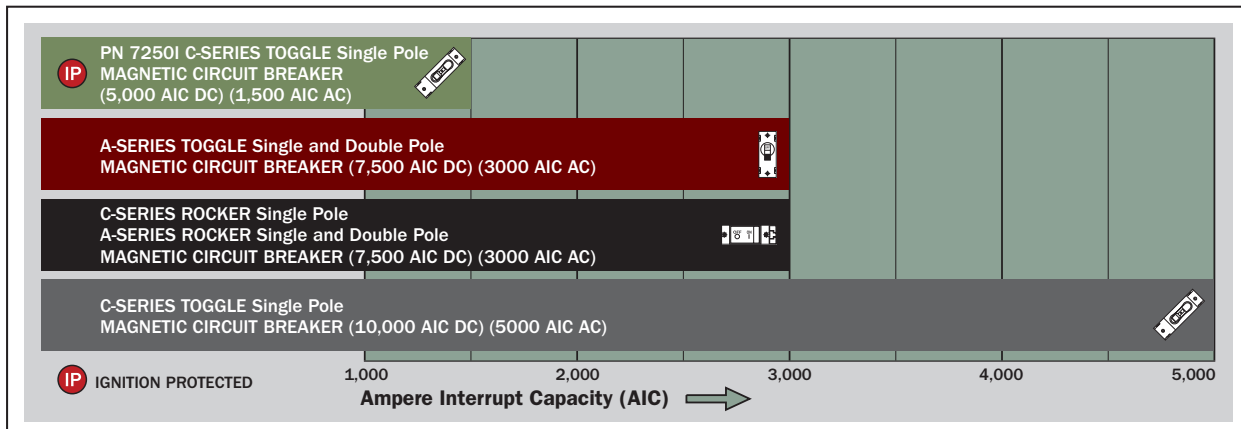
In marine AC systems there are two common methods used to assure that two different AC sources are never connected to each other. AC Lockout Slides are devices that slide between circuit breaker handles and allow only 1 handle to be in the "ON" position at a time. Circuit breakers with properly configured slides can have different numbers of poles and different current ratings for each breaker. AC Rotary Switches use a switching mechanism to prevent connection of different AC sources. Each system has its advantages and disadvantages as shown below:

Rotary Switch Source Selector Wiring Diagram	Lockout Slide Source Selector Wiring Diagram
<p>Advantages: Compact, can handle up to 4 sources, intuitive operation</p> <p>Disadvantages: Expensive relative to lockout slides, requires additional circuit protection</p>	<p>Advantages: Integrates circuit protection and source selection into 1 unit, lower cost for both circuit protection and source selection, flexible configurations for dual shore cords</p> <p>Disadvantages: Requires more space, impractical for more than 3 sources</p>

Follow These Steps to Select AC Circuit Protection:

- 1) Determine these two numbers:
 - a. The amperage capacity of the smallest wire in the circuit to be protected. See the ABYC Ampacity Rating Table on page 114.
 - b. The maximum continuous current that will flow in the circuit.
- 2) Consult the ABYC Interrupt Rating Table on page 118 for the minimum Interrupt rating required for the application. Limit the selection to a circuit breaker type that meets the interrupt capacity requirement.
- 3) Select a circuit breaker amperage rating that is:
 - a. Smaller than the amperage capacity of the smallest wire (from step 1a)
 - b. Larger than the maximum continuous current that will flow in the circuit (from step 1b) It is recommended that the amperage rating be at the upper end of this range to allow for surge currents and increase in the number of devices on the circuit.
- 4) Verify that the voltage rating of the selected circuit breaker meets or exceeds the circuit voltage.
- 5) There are other issues that may be considered by reading ABYC E-11.12 Circuit Protection. See www.blueseas.com for ABYC Standards.

Circuit Protection Device Comparison Table



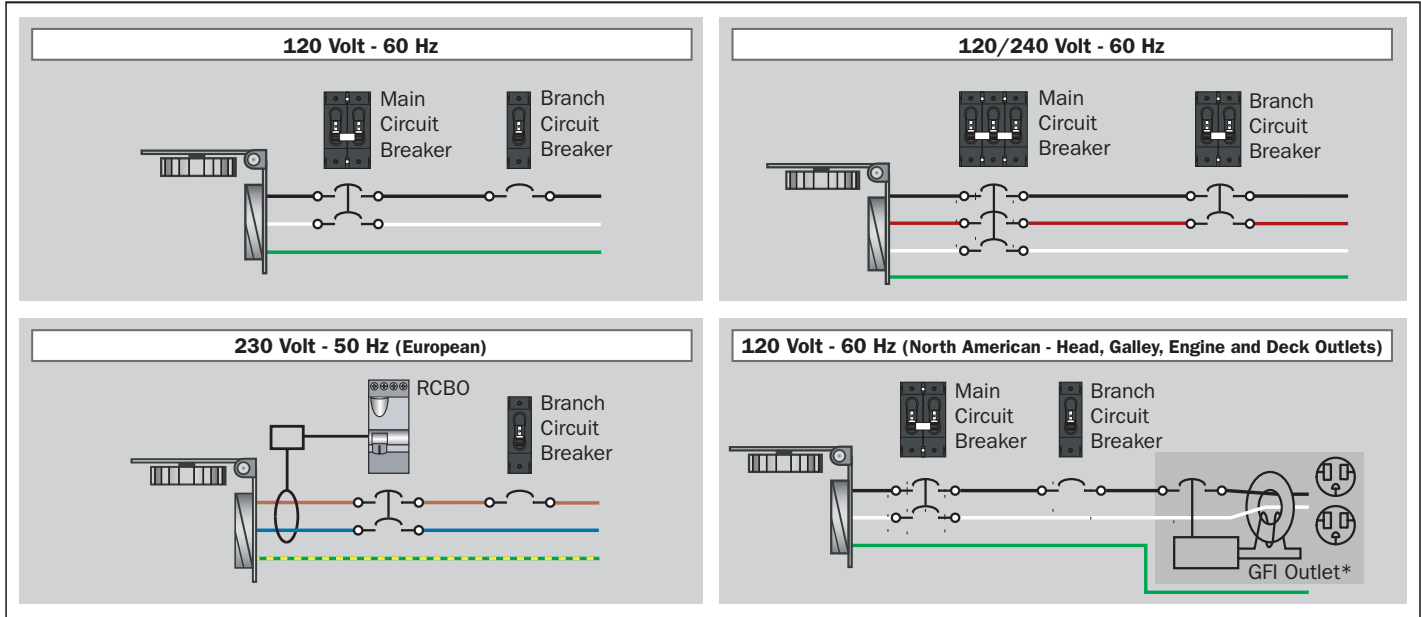
3 AC Branch Power Distribution and Circuit Protection

Purpose

- Distribution of high amperage currents from a single cable into lower amperages in multiple wires
- Circuit protection
- Switching
- GFCI (page 122) in North American systems

Considerations

Circuit breakers used for AC branch switching and circuit protection always have one pole less than the AC main installed between the branch circuit breaker and the AC power source. This circuit breaker is installed in the AC hot conductor.



The Devices. AC branch circuit breakers are distinguished by their AIC rating. The ABYC Interrupt Rating Table below shows the AIC required in AC branch circuit breakers for each type of shore power commonly found in marinas.

As it is only in 120 Volt and 120/240 Volt systems that AC main circuit and AC branch circuit requirements differ, the same circuit breakers that are used in AC main systems are used in AC branch applications. It is only in the number of poles that main and branch circuit breakers differ (See page 117 for Steps to Selecting AC Circuit Protection).

ABYC Interrupt Rating Table

AC Shore Power Source	Branch Circuit Breaker	Main Circuit Breaker
120V - 30A	3,000	3,000
120V - 50A	3,000	3,000
120/240V - 50A	3,000	5,000
240V - 50A	3,000	5,000

***ABYC Requirements**

11.15.3.5. If installed in a head, galley, machinery space, or on a weather deck, the receptacle shall be protected by a Type A (nominal 5 milliamperes) Ground Fault Circuit Interrupter (GFCI). (See E-11.13.)

NUMERIC

120V AC

The line to neutral voltage in a single-phase two wire AC, not including green safety ground, system as commonly found in the US.

240V AC

The line to line voltage in a single-phase three wire (not including green safety ground) AC system as commonly found in the US.

230V AC

The line to neutral voltage in a single-phase two wire (not including green safety ground) AC system as commonly found in Europe and many other parts of the world.

3 phase *see also Single Phase*

Refers to 3 phase power generation typically 480V AC and higher. The AC utility is a three-phase system. In its simplest form there are three conductors connected to three conductive coils, which pass through a magnetic field, thus, inducing the electrons in the wires to flow. As the polarity of the magnetic field changes from North to South, electrons are induced to flow first one way then the other. This produces AC current flow. The current that is induced in the three wires is 120° out of phase. The current flow in the first conductor starts 120° before the second and it starts 120° before the third. Three phase generators are only found on the largest boats.

3 stage charging

A technique of battery charging that uses three distinct stages to ensure a fast and complete charge and a safe maintenance voltage. As there are several manufacturers of multiple stage charging systems, there is a slight difference in terminology in the field. See each key word for a more complete definition.

- Stage 1: Charge or Bulk Mode
- Stage 2: Acceptance or Absorption
- Stage 3: Float

A

ABYC

American Boat and Yacht Council, a voluntary standards creating body for the marine industry responsible for Standards and Recommended Practices.

AC

see Alternating Current

AFD

see Alternator Field Disconnect

AGC Fuse

A 1-1/4 inch long x 1/4 inch diameter glass fuse with fast blow characteristics.

AIC Amperes Interrupt Capacity

see Interrupt Rating

ATO/ATC Fuse

The blade type fuse now commonly used in the automobile industry. It has fast blow characteristics like the AGC fuse.

AWG (American Wire Gauge)

see also SAE Wire Gauge

AWG (American Wire Gauge) is a U.S. standard set of non-ferrous (copper or aluminum) wire conductor sizes. The "gauge" refers to the diameter. Typical household wiring is AWG number 12 or 14. Telephone wire is usually 22, 24, or 26. The higher the gauge number, the smaller the diameter and the thinner the wire. Thicker wire can carry more current because it has less electrical resistance over a given length. Also larger wire is used when the voltage drop along its length must be minimized. For example: High output alternator wiring might be a 2 AWG while the starter cable for a modest engine a 1 or 0 AWG.

absorption *see 3 Stage Charging*

see also Float Charge, Bulk, Equalization

Absorption refers to the second phase of a multistage charging system, also called acceptance by some manufacturers. During the absorption cycle the battery is maintained at the maximum charging voltage. Typically about 2.4V per cell or 14.4V for a typical 12V system. (28.8V for a 24V system). This is the gassing voltage for a liquid battery. Gelled batteries are typically charged at slightly lower voltages. The gassing voltage is also temperature dependent. The battery cannot be maintained for long periods of time in the absorption phase.

acceptance

see absorption

alternating current

A periodic current (sine wave) with an average value over a cycle of zero. The current reverses at regular intervals of time and has alternately positive and negative values.

alternator

Commonly refers to the DC charging source on an engine. The alternator is a three-phase AC device that produces alternating current, which is then rectified by a diode bridge to create direct current. Three-phase AC devices are reliable and inexpensive to make compared to a DC generator of the same ampacity.

alternator field disconnect

The alternator field is created by a coil of wire surrounded by ferrous metals. When the coil is energized with electric current it becomes an electro-magnet. This electromagnet is rotated, inducing current flow in the three phase coils that surround it. By controlling the strength of the magnetic field, the output of the alternator may be controlled. If the output of the alternator is open circuited there is no place for the energy to go. The voltage rises to a dangerous level. By disconnecting the alternator field, the magnetic field is turned off, thus the voltage cannot soar. This is a safety feature on some battery switches.

ambient temperature

The temperature of the medium in which the heat of a device is dissipated. The ambient temperature is often specified in standards for device performance (such as the UL Standards) as the basis for determining the heat rise of the component.

ammeter

Ammeter measures current flow in a circuit. An ammeter is inserted in series in the circuit. We consider four types:

Analog

The classic analog ammeter uses the magnetic field associated with current flow through a moving coil of wire, to in turn move a needle over a meter face which displays amps. This type of meter can only measure very small current, micro-amps, before the moving coil becomes too large to be practical. To measure higher currents a shunt resistor is inserted into the circuit. (see Shunt). Most of the current flows through the shunt resistor but some passes through a meter movement as described to read amps when the movement is scaled appropriately.

Digital DC

The digital DC ammeter uses a shunt resistor to measure current flow. (see Shunt). The shunt is connected in series in the wiring of the circuit whose current is to be measured. The shunt sense leads are connected to the DC ammeter, which is really a millivolt meter. The millivolt input from the shunt is scaled to read amps per the resistance of the shunt. For example, a current flow of 10 amps through a 100A-100mV shunt would result in a voltage of 10mV across the sense leads. A millivolt meter would display 10, which we would interpret as 10 Amps.

Digital AC

The digital AC ammeter also uses a shunt resistor to measure a voltage drop, which is then scaled to read amps. The difference, however, is that the resistor is not normally connected directly in the AC wire of the circuit to be measured. A device called a current transformer (CT, see Current Transformer) is placed around the AC wire. A current is induced in the CT, which is then passed through a load resistor. The digital meter actually measures the voltage across this load resistor and internally scales it to read the appropriate number of amps.

Portable

Most portable meters today are digital and use the same techniques of measurement as described above. However, they are commonly limited to a few amps when connected in series to measure current. If high currents are to be measured, the portable meter must use some external sensing means. Commonly these consist of shunt resistors and clamp-on ammeter sensors that use Hall Effect sensors. (Operation of which are beyond the scope of this appendix. In short, they generate a voltage, which can be scaled to read amps just as the shunt resistor.)

ampacity

The current carrying capacity of a conductor or device.

ampere *see Coulomb*

Definition 1

The classic definition of an ampere is a unit of electric current flow equivalent to the motion of 1 coulomb of charge, or 6.25 X 10¹⁸ electrons, past any cross section in 1 second. This is an intuitive way to think about an ampere. It is the flow of a huge number of electrons through a conductor.

Definition 2

In 1948 this alternative definition was adopted: A unit of electric current in the meter-kilogram-second system. It is the steady current that when flowing in straight parallel wires of infinite length and negligible cross section, separated by a distance of one meter in free space, produces a force between the wires of 2 x 10⁻⁷ newtons per meter of length.

ampere-hour

The electric charge transferred past a specified circuit point by a current of one ampere in one hour.

Amp-Hour Rating (AH)

This is a common rating for batteries. This is the total number of ampere-hours that a battery can deliver over 20 hours at a constant rate of discharge before the battery voltage falls below 10.5 volts.

analog

Refers to a signal or input that varies continuously over time. Voltages and currents are analog signals, as are temperature and pressure.

anode

The electrode of an electrochemical cell with the more negative potential. The less noble metal of an electrolytic cell that tends to corrode.

B

battery *see also Cell*

Two or more cells connected together. Thus a group of batteries connected together can also be referred to as a battery.

battery bank

When groups of batteries are wired in series or parallel or a combination to increase voltage or capacity the entire group is referred to as a battery bank. When batteries are connected in series the amp-hour rating is the same and the voltage is additive. When batteries are connected in parallel the voltage is the same and the amp-hour rating is additive.

battery state-of-charge

The term is used to describe and estimate of how much energy the battery is able to deliver. There have been many attempts to develop improved state-of-charge estimates. The most common methods include: specific gravity, at-rest open-circuit voltage, and amp-hour measurement.

battery switch rating

see *Continuous Switch Rating and Intermittent Switch Rating*

battery types

AGM (Absorbed Glass Mat)

A technique for sealed lead-acid batteries. The electrolyte is absorbed in a matrix of glass fibers, which holds the electrolyte next to the plate, and immobilizes it, preventing spills. AGM batteries tend to have good power characteristics, low internal resistance, and good behavior during charging.

Flooded

A design for lead-acid batteries. The electrolyte is an ordinary liquid solution of sulfuric acid. Flooded cells are prone to making gas while being charged. Flooded cells must be periodically checked for fluid level and water added as necessary. Flooded cells are also typically less expensive than AGM or gel cell type lead-acid batteries.

Gel cell

Gel or sealed lead acid batteries are basically the same chemistry as a wet (flooded cell) battery. The batteries' electrolyte is in a gelatin form and is absorbed into the plates and the battery is sealed with epoxies. The batteries are exceptionally leak resistant and may be used in any position. Battery uses include UPS, emergency lights, and camcorders. These batteries are 2 volts per cell, so the common batteries are 4, 6, and 12 volt.

blade

That portion of a fuse to which the fuse block connects.

bonding, cathodic

The electrical interconnection of metal objects in common contact with water, to the engine negative terminal, or its bus, and to the source of cathodic protection.

branch circuit see also Main

The portion of the wiring system after the main circuit protection device.

break (rating)

The amount of current that can be passing through a set of contacts, such as those in a solenoid, when they open, without damaging the contacts. This can be a rating for a single event or over some number of cycles, generally 1000, 10,000 or 1,000,000.

bulk

That part of a multi-stage charge regime at which the maximum amount of current is flowing. This is normally limited by the size of the charging source. Lead acid batteries have the ability to accept, or absorb, large charging currents as long as they do not overheat or begin gassing. The bulk cycle allows the fastest possible charge.

bus, busbar

A bus is a group of common connections, often consisting of a strip of copper or brass with a number of screws or bolt studs for the connection of wires. It may be a negative or a positive bus.

C

CE (Conformité Européenné)

The CE marking is a conformity marking consisting of the letters "CE". The CE marking is applied to products regulated by certain European health, safety and environmental protection legislation. The CE marking is obligatory for products it applies to. The manufacturer affixes the marking certifying that the product conforms to applicable regulations, in order to be allowed to sell the product in the European market.

CFR (Code of Federal Regulations)

The written regulations of the United States Federal Government.

cathode

The electrode of an electrochemical cell with the more positive potential. The more noble metal of an electrolytic cell that tends not to corrode.

cell

An electrochemical system that converts chemical energy into electrical energy. Typically consisting of two conductive plates with different galvanic potential immersed in an electrolyte.

cell, primary

An electrochemical device, which is discharged only once and then, discarded.

cell, secondary

see also *Battery*
An electrochemical device, which may be discharged and recharged a number of times.

charge

Classically refers to an accumulation of electrons producing an electrostatic charge. In common use it often refers to restoring energy to a battery. Specifically, it would refer to the part of a multi-stage battery charging cycle when the voltage was held constant at or about the gassing voltage.

charge cycle

The stages through which a multi-stage charging source restores energy to a battery. A four-stage charge cycle includes:

bulk or charge cycle

Constant current for fast charging

acceptance or absorption cycle

Constant voltage for thorough charging

float cycle

For maintenance and long life

equalization cycle

Controlled overcharge for maximum capacity.

see *key words above*

circuit

A closed path of electrically, or electro-magnetically connected, components or devices that is capable of current flow. Typically consisting of loads, sources, conductors, and circuit protection (circuit breakers and fuses). For example: A battery, fuse, and bilge pump connected together with wire are a circuit. The path must be continuous and closed.

circuit breaker

A device that, like a fuse, interrupts current in an electric circuit when the current becomes too high. Unlike a fuse, a circuit breaker can be reset after it has tripped. When high current passes through the circuit breaker, the heat it generates or the magnetic field it creates causes a trigger to rapidly separate the pair of contacts that normally conduct the current.

Circular mils

A method of specifying wire size mathematically. One Circular Mil is a unit of area equal to that of a circle .001" in diameter. The actual area of a Circular Mil is:

$$A = \pi r^2$$

$$A = 3.1428 \times (.0005)^2 \text{ inches}$$

$$A = .0000007857 \text{ square inches}$$

Class-T fuse

A very robust fuse with a 20,000 AIC. It also has very fast response to short circuit currents.

coil

see *inductor*

Cold Cranking Amperes (CCA)

see also *Marine Cranking Amperes*

CCA is the discharge load in amps which a battery can sustain for 30 seconds at 0° F. (-18° C) and not fall below 1.2 volts per cell (7.2V on 12V battery). This battery rating measures a burst of energy that an engine needs to start in a cold environment. This

rating is used mainly for rating batteries for engine starting capacity and does not apply to NiCad batteries, NiMH batteries or Alkaline batteries.

common

May have more than one meaning. Typically denotes a bus that is at ground potential most often. The negative bus is called "the common"; sometimes the neutral bus is also called "the common". May also mean a group of connections that are connected together "in common" even though they are at a different potential than ground.

conductivity

Conductance is the reciprocal of resistance, which depends on the resistivity constant of the material. Resistivity is the resistance of a conductor having unit cross section and unit length. Conductivity is the reciprocal of the resistivity. Its units are 1/ohm-cm or ohm/cm, or 1/ohm-circular mils/ft.

conductor

That part of an electrical circuit whose resistance relative to the balance of the circuit is zero. For example, in a circuit consisting of a light bulb and a battery, connected together with wire, the wire is referred to as the conductor.

Conformité Européenné

see *CE*

continuous current

The current flow, which a device or a conductor can carry, consume, or supply with no time limit. The continuous current rating is normally dependent on the temperature, since resistance increases with temperature. For battery switches the continuous current rating is established by testing for one hour at the rating. This is reasonable since thermal equilibrium would be reached within one hour.

continuous switch rating (UL 1107)

The two ratings in the UL marine battery switch standard are Intermittent and Continuous. Intermittent is a 5 minute rating and is based on temperature rise of various sections of the switch as the rated current is applied over a 5 minute period. The Continuous rating is the same, but the time period is 1 hour.

converter

An electrical device that converts one type of electrical energy into another. Battery chargers convert AC power to DC to charge the battery. Inverters convert DC power into AC, both are converters. Often used in RV industry to mean a power supply that runs the domestic DC loads when shore power is available.

coulomb see also Ampere

The measurement unit of electric charge, which is determined by the number of electrons in excess (or less than) the number of protons. Classically a charge of 1 coulomb = 6.25 X 10¹⁸ electrons. The meter-kilogram-second unit of electrical charge equal to the quantity of charge transferred in one second by a steady current of one ampere.

counterpoise

That portion of an antenna system composed of wires or other types of conductor arranged in a circular pattern at the base of the antenna at a certain distance above ground. Insulated from the ground, it forms the lower system of antenna conductors.

cranking (starting)

Normally associated with "cranking current" which is the current required by the starter circuit prior to engine starting. The cranking current varies significantly during the starting cycle. Initially, there is a large surge of current required to overcome the inertia and compression of the engine. This surge can be two to four times the average cranking current. Once the engine is turning there are peaks and valleys as the pistons go through the compression and exhaust cycles. The cranking current rating is used for sizing batteries, cables, and battery switches.

current *see also Amperage*

Current is a flow of electrical charge carriers, usually electrons or electron-deficient atoms. The common symbol for current is the uppercase letter I. The standard unit is the ampere, symbolized by A. Physicists consider current to flow from relatively positive points to relatively negative points; this is called conventional current or Franklin current. Electrons, the most common charge carriers, are negatively charged. They flow from relatively negative points to relatively positive points.

Electric current can be either direct or alternating. Direct current (DC) flows in the same direction at all points in time, although the instantaneous magnitude of the current might vary. In an alternating current (AC), the flow of charge carriers reverses direction periodically. The number of complete AC cycles per second is the frequency, which is measured in Hertz. An example of pure DC is the current produced by an electrochemical cell. The output of a power-supply rectifier, prior to filtering, is an example of pulsating DC. The output of common utility outlets is AC.

current rating

The maximum current in amperes that a device will carry continuously under defined conditions without exceeding specified performance limits.

current transformer *see also Ammeter*

The "CT", as current transformers are commonly referred to, is used by AC ammeters to "sense" current flow in a wire in an AC circuit. It is a toroidal coil of wire through which a wire whose current we wish to measure is passed. It is normally encapsulated and looks like a "doughnut", which is how electricians commonly refer to it. The doughnut has two wires coming out of it, which are connected to the AC ammeter. As current flows in the AC wire we wish to measure, it induces a current flow in the current transformer. The magnitude of the current varies directly with the current flowing in the AC wire. Current transformers are rated by the number of maximum amps that can flow in the measured wire and the current generated, by the CT, at that current flow. For example: A 50:5 CT is rated for 50 amps flowing in the measured wire, and it generates 5 amps of current as a consequence.

cycle

A cycle of a battery is a discharge plus a charge. For example, if a fully charged battery has a load applied, is then discharged and recharged, that is one cycle. Cycle life is the total number of cycles a battery yields.

D

DC *see Direct Current*

deep-cycle batteries

Batteries with thick plates to allow for reserve energy to be stored within the battery plate and released during slow discharge for prolonged periods. The high-density active material remains within the batteries' plate/grid structure longer, resisting the normal degradation found in cycling conditions. Deep cycle batteries are typically used where the battery is discharged to a great extent and then recharged.

delay

A difference in time between the initiation of an event and its occurrence, or between an event's observation and enunciation of it. This is usually used to refer to the time between the application of current through to a fuse or circuit breaker and the time when the device opens.

derating

A decrease in a device's rating, usually amperage, due to its application in ambient conditions different from those in which it was tested or for which it was designed originally.

dielectric strength

The maximum voltage that a material can withstand without allowing the two voltage potentials to short together.

Specifications subject to change. See www.blueseas.com for current information.

digital

A digital signal is one which has only two valid values denoted as 1 or 0. Commonly these are equated to distinctly different voltage. For example: A voltage of +5V would equal a 1 and a voltage of 0V would equal a 0.

A digital meter is one that displays values as numerical values rather than as the position of a meter on a relative scale.

Direct Current (DC)

An electric current that always flows in the same direction. The magnitude may vary but the current direction is always the same. Commonly referred to as DC. Examples of direct current sources are batteries, fuel cells, and photovoltaic cells. DC sources such as battery chargers and alternators actually use rectified AC current as the source.

discharge

Refers to the consumption of energy from a battery, or to the electrostatic discharge associated with a lightning bolt, capacitor, etc.

double insulation system

An insulation system comprised of basic insulation and supplementary insulation, with the two insulations physically separated and arranged so they are not simultaneously subjected to the same deteriorating influences to the same degree.

double pole

Indicates a switch, relay, or circuit breaker with two separate conductive paths, which are opened or closed simultaneously when the device is operated.

E

Earth

The third planet from the sun in Astronomy, but in electrical terms it refers to a connection, which is made to a conductor that is connected to the planet Earth. In grounded electrical systems there is a connection, which is a copper rod or some other highly electrically conductive connection, to the actual Earth. This is to ensure a safe conductive path for a short circuit, which in turn helps prevent electrocution.

electrode

A conductive material, in an electrolyte, through which electrical current enters or leaves.

electrolysis

Chemical changes in a solution, or electrolyte, due to the passage of electric current.

electrolyte

A liquid in which ions are capable of migrating and, therefore capable of conducting current. Solutions of acids, bases, and salts in water are electrolytes.

electron *see also Coulomb*

An electron is a negatively charged subatomic particle. It can be either free (not attached to any atom), or bound to the nucleus of an atom. In electrical conductors, current flow results from the movement of free electrons from atom to atom individually, and from negative to positive electric poles in general.

The charge on a single electron is considered as the unit electrical charge. It is assigned negative polarity. Electrical charge quantity is not usually measured in terms of the charge on a single electron, because this is an extremely small charge. Instead, the standard unit of electrical charge quantity is the coulomb, symbolized by C, representing about 6.25×10^{18} electrons.

Electromotive Force (EMF)

Commonly referred to as voltage, electromotive force is the energy per unit of charge that is supplied by a source of electrical energy such as a battery, charger or alternator.

Electromagnetic Interference (EMI)

Noise generated by a load (typically by electrical switching action). Usually specified as meeting agency limits for conducted EMI (noise conducted back onto the power bus) or radiated EMI (noise emitted into the area surrounding a device).

energy *see also Power*

The classically simple definition is, the capacity to do work. Energy may be manifested as, mechanical motion, thermal heat, or electrical power, which is consumed, radiated, dissipated, or stored over a period of time. The energy in a direct-current circuit is equal to the product of the voltage in volts, the current in amperes, and the time in seconds. The units for energy are Watt-hours. In alternating current (AC) circuits, the expression for energy is more complex.

engine negative terminal

The point at which the engine negative, generally the engine block, is connected to the negative of the battery.

equalization *see Charge Cycle*

Equalization is a controlled overcharge, which removes lead-sulfate that is not converted during normal charging. Equalization is best accomplished by using a constant current of 2-7% of battery capacity while allowing the battery voltage to rise to its highest "natural voltage". For a 12V battery this can be as high as 16.2V. The equalization cycle is continued until the specific gravity of all cells cease to continue to rise and are approximately equal. The equalization cycle should only be used on liquid electrolyte batteries and only while the operator is on the premises.

equalizer

A device wired across the same potential poles of a multiple bank battery bank consisting of serially wired batteries, i.e., two 12 volt batteries in series to produce 24 volts. An equalizer maintains half its input voltage at its output terminals. When loads are taken off one of the batteries in the bank at that batteries voltage, which is half of the bank voltage, the equalizer senses that battery's voltage is no longer the one half the voltage of the entire bank and the equalizer "recharges" the lower voltage battery from the higher voltage battery.

F

fast, fast acting *see also Delay*

Refers to the amount of time that a fuse can endure an over-current before blowing. Fast fuses are used to protect sensitive equipment.

fault

A defect in the normal circuit configuration, usually due to unintentional grounding. Commonly referred to as a short circuit.

field

Typically refers to a magnetic field. Specifically used when discussing the rotating electro-magnetic field associated with an alternator. By varying the field current, thus its strength, the output of the alternator may be controlled.

float charge

see also Bulk, Acceptance, Equalization

A constant voltage, well below the gassing point, that is applied to a battery to maintain its capacity. The voltage is such that neither charging nor discharging is occurring.

frequency *see also Hertz*

For an oscillating or varying current, frequency is the number of complete cycles per second in alternating current direction. The standard unit of frequency is the hertz, abbreviated Hz. If a current completes one cycle per second, then the frequency is 1 Hz; 60 cycles per second equals 60 Hz (the standard alternating-current utility frequency).

fuse

A fuse is a safety device, consisting of a strip of low-melting-point alloy, which is inserted in an electric circuit to prevent excess current from flowing. If the current becomes too high the alloy strip melts, opening the circuit.

fusible link

A type of fuse with a replaceable conductive alloy link that may be replaced if it “blows” due to over-current.

G

galvanic corrosion

The corrosion that occurs at the anode(s) of a galvanic cell.

galvanic isolator

A device installed in series with the (AC) grounding (green) conductor of the shore-power cable to effectively block low voltage DC galvanic current flow, but permit the passage of alternating current (AC) normally associated with the (AC) grounding (green) conductor. This is typically two diodes wired in parallel facing opposite directions, sized to meet full fault current.

galvanic compatibility chart

A list of metals and alloys arranged in order of their potentials as measured in relation to a reference electrode when immersed in seawater. The table of potentials is arranged with the anodic or least noble metals at one end, and the cathodic or most noble metals at the other.

generator

A rotating machine capable of generating electrical power. In the narrow definition generator refers to a DC machine and alternator refers to an AC machine. However, in common use the term generator is used to refer to AC machines as well.

green wire

The green wire is the non-current carrying safety grounding wire in an AC system in the United States. It is connected to an exposed metal part in the electrical system to provide a path for fault current in the case of a short circuit.

ground fault

GFI (Ground Fault Interrupter)

GFI is a generic term referring to both GFCI and GFP

GFCI (Ground Fault Circuit Interrupter) see GFI

A device intended for the protection of personnel that functions to de-energize a circuit, or portion thereof, within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

GFP (Ground Fault Protector) see GFI

A device intended to protect equipment by interrupting the electric current to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protection device of that supply circuit.

ground, ground conductor

A point in a circuit which is at zero potential with respect to the Earth, or which is at the lowest potential in the system, (as with a floating ground).

grounded

The AC current carrying conductor that is intentionally maintained at ground potential, also called neutral.

grounding, grounding conductor

The AC conductor, not normally carrying current, used to connect the metallic non-current carrying parts of electrical equipment to the AC system and engine negative terminal, or its bus, and to the shore AC grounding conductor through the shore power cable. This term can also refer to the normally non-current carrying conductor used to connect metallic non-current carrying parts of direct current devices to the engine negative terminal, or its bus, to minimize stray current corrosion.

ground plate

A conductive plate, commonly sintered copper, that is placed in contact with seawater to provide a connection to earth for a boat's ground systems.

H

Hertz *see Frequency*

Hertz is a unit of frequency of one cycle per second. It replaces the earlier term of “cycle per second (cps).” The abbreviation for Hertz is Hz.

hot

Hot usually refers to the ungrounded current carrying conductors in an AC system. These would typically have a voltage of 120V or 240V in the United States. The term Hot is also used to describe a circuit that is energized, and has a potential greater than ground.

I

IACS

see International Annealed Copper Standard

Impressed current

Direct current supplied by a device employing a power source external to the electrode system of a cathodic protection installation. The impressed current is used to counteract the undesired galvanic current.

inductance

An effect in electrical systems in which electrical currents store energy temporarily in magnetic fields before that energy is returned to the circuit.

inductor *see Coil*

A length of wire that is wound around a core that is used as a storage element for a magnetic field in an electric circuit.

inrush

The momentary steep wave front of very high current exhibited by a load on initial application of power.

Intermittent switch rating (UL 1107)

The two ratings in the UL marine battery switch standard are Intermittent and Continuous. Intermittent is a 5 minute rating and is based on temperature rise of various sections of the switch as the rated current is applied over a 5 minute period. The Continuous rating is the same, but the time period is 1 hour.

International Annealed Copper Standard

Abbreviated as IACS, this is a measurement of relative electrical conductivity that uses copper as the standard of 100%. The expression “Brass 28 IACS” would mean that the brass under discussion had 28% of the electrical conductivity of an identically sized piece of copper.

interrupt rating (AIC)

The fault current that a device, normally a fuse or circuit breaker, is capable of breaking without damage to the circuit.

inverter

An inverter converts DC power stored in a battery to AC power which is used by most household appliances.

ignition protection (IP)

Devices, which operate in a potentially explosive environment, must be ignition protected. This would include engine rooms with gasoline engines. There is a very specific set of tests which a device must pass to claim ignition protection. They include operating safely in an explosive mixture of propane and air.

isolation transformer

A transformer that is inserted in series with the incoming AC power to provide a magnetic coupling for power between the ship's systems and the AC grid. By magnetically coupling the power there is no direct connection by wires, which isolates the ships AC system from the AC grid.

isolator

Refers to two or more diodes wired in parallel and then inserted in series with the output of an alternator. This allows for the alternator to charge multiple batteries. The voltage drop across the diodes can cause incomplete charging. Isolators should not be used with alternators that use internal voltage sensing for regulation. To be properly installed the voltage sense lead must come from the house battery.

J, K

kilo

A prefix in the metric system equal to 1000 times, as in kilohertz, 1000 cycles per second.

L

line *see also Load*

The conductors that are at the supply of energy to a circuit. Line normally refers to the current carrying non-grounded conductors in an AC system.

line loss *see Voltage Drop*

The power loss that occurs due to amperage flowing through the resistance of conductors over their length.

listed (UL Listed)

Indicates that a device or component has met certain specifications as set forth by Underwriters Laboratory. Further, it means that the device or component has been tested for conformance and ‘listed’ with UL so it can use the UL logo and claim conformance to the specification.

load *see also Line*

A device that consumes power and does work.

load group

A collection of loads, which normally have similar characteristics. For example the lighting circuits might be considered a load group. Also implies that the loads are supplied by a common bus.

lockouts (AC)

A device allowing the selection of only one source from multiple AC sources, preventing the connection of more than one source of AC power to a bus at the same time.

M

magnetic

Displaying the characteristics of a magnet, including being able to induce current flow in a conductor when relative motion exists between them and being able to attract ferrous materials.

main *see also Branch Circuit*

Refers to the main circuit breaker or bus in a power distribution system. This is the input power source for the system.

make (rating)

The current that a breaker, switch, or relay can connect into without damaging the device.

make before break

Describes a switch action that connects the new circuit before disconnecting the old. This type of switch action is required for battery selector switches in order to avoid an open circuit for the engine alternator, which can cause extreme voltages that can damage the alternator and accessory electronics.

Marine Cranking Amperes (MCA)

MCA is the discharge load in amps, which a battery can sustain for 30 seconds at 32°F (0° C), and not fall below 1.2 volts per cell (7.2V on 12V battery). This battery rating measures a burst of energy that an engine needs to start in a cold environment.

modified sine wave

A marketing term to describe an AC waveform, created by an inverter that is a pulse width controlled square wave. While an improvement on the classic square wave inverter, it is not actually a sine wave or a close approximation.

motor circuit protection

Motors require circuit breakers or fuses that are specifically designed for their current requirements. This is because motors require a high initial surge of current to get them started.

N

NEC see *National Electrical Code*

NEMA

National Electrical Manufacturers Association

N-type (alternator)

An N-type alternator has a set of diodes, called the diode trio, which supply the positive DC potential required for the rotating field current. The actual regulator switches the negative to achieve the proper field strength to create the desired correct alternator output.

National Electrical Code NEC

The NEC is developed and maintained by the National Fire Protection Association which describes how residential, commercial, and RV electrical systems must be installed. The NEC is adopted, sometimes with revision, by states that also adopt the Uniform Building Code. Electrical inspections required by most building permits follow the NEC. While not required aboard boats, the NEC is a valuable guide to safe electrical systems. The goal of the NEC is personal safety and fire prevention.

neutral see also *Single Phase*

The neutral is the grounded current carrying conductor in a single phase, four wire, 120/240V AC system.

neutral-to-ground bonding

Connecting the ground and the neutral together via an electrical conductor.

neutral-to-ground switching

In the US, inverter/charger installations that are used in marine applications must have neutral-to-ground switching. This guarantees that the neutral and the green wire are common after the green wire connection to neutral that is achieved through the shore power cord no longer exists after the cord is disconnected and shore AC is no longer serving as the boat's AC source. There must also be only a single ground point in the AC system. This prevents a voltage differential from developing between the boat's AC neutral and the shore or genset AC neutral, which may cause an electric shock or nuisance tripping of GFI's.

non-inverter loads

Non-inverter loads are heavy loads that are not appropriate to run from an inverter because the load on the batteries would be excessive or illogical. They include hot water heater, electric space heat, air conditioning, heavy pumping loads, etc. A battery charger that supplies the same battery as is being used by the inverter would also be a non-inverter load.

nuisance trip

A circuit breaker or fuse, which trips or blows without the circuit actually being overloaded. This may be due to weak breaker or a surge current which requires a slow tripping breaker or a slow blow fuse.

O

ohm

The unit for resistance equals V/I = volts/amperes. The unit of resistance is the ohm, symbol Ω , the Greek letter Omega.

Ohm's law

States that the ratio of the EMF (Electromotive Force) applied to a closed circuit to the current in the circuit is a constant. That constant is the resistance of the circuit. It may be stated as $V= IR$ (or $E=IR$, using E as the abbreviation of EMF whose units are volts). The unit of resistance is the ohm.

open

Indicates a condition in an electric circuit in which there is a break in the conductive path. The break may be intentional such as an open switch or relay or it may be unintentional such as a broken wire or a blown fuse. In any case, the continuous conductive path required for an electric circuit is not available.

open circuit voltage

Generally, the voltage of a source when it is not connected to a load through an electrical circuit. Specifically, the voltage of a battery when it is not delivering or receiving power. A typical value for a liquid lead acid battery is 12.8V for a fully charged battery which has not been charged or used for 24 hours. Open circuit voltage is sometimes used as an indicator of the state-of-charge of a battery.

The table below gives typical open circuit voltages for both liquid and gelled electrolyte lead-acid batteries at various states-of-charge. These voltages should be considered approximations and may vary according to manufacturer and the specific gravity of the electrolyte the battery is initially filled with.

Typical Open Circuit Voltage After 24 Hours for Liquid and Gelled Electrolyte Batteries

Percent Charge	Liquid Electrolyte per cell voltage	Liquid Electrolyte Nominal 12V Battery	Gelled Electrolyte per cell voltage	Gelled Electrolyte Nominal 12V Battery
100%	2.10	12.60	2.175	13.05
80%	2.09	12.54	2.13	12.78
60%	2.07	12.42	2.08	12.48
40%	2.04	12.24	2.05	12.30
20%	1.98	11.80	2.02	12.12
0%	1.95	11.70	1.98	11.88

overcurrent

When the current in a circuit exceeds the rating of the devices or conductors in it. Fuses and circuit breakers protect from overcurrent by opening the circuit if such a condition exists and/or persists.

P

PE

see *Protective Earth*

P-type (alternator)

A P-type alternator is one which one end of the coil which supplies the rotating magnetic field is connected to the negative and the regulator controls the positive side of the coil to regulate the alternator output.

panelboard

A collection of circuit breakers, switches, and instrumentation installed into a panel which provides the central point for power distribution and monitoring for the electrical system. May also refer to a smaller panel which is located remotely from the main panel which is used to supply loads in the adjacent area. In the marine industry they are usually called "panels", or "circuit breaker panels", or "distribution panels".

parallel circuit

An electrical circuit in which the positive connections are all in common and the negative connections are all in common. The voltage of the system appears across each branch of the circuit. The current varies as required by each load or source.

parallel device

A switch, solenoid, relay, or solid state device which is used to connect multiple batteries or busses together.

paralleling switch

Typically refers to a battery switch that allows multiple batteries to be connected together for engine starting. Often used to connect the battery serving the domestic system to the engine starting circuit for emergencies.

percent of charge

An estimate of the remaining charge in a battery. Percent of charge is very difficult to determine accurately without sophisticated microprocessor based calculations.

Peukert's equation

A formula that shows how the available capacity of a lead-acid battery changes according to the rate of discharge. The capacity of a battery is expressed in Amp-Hours, but the simple formula of current times hours does not accurately represent the situation. Peukert found that the equation: $C = I^n T$ fits the observed behavior of batteries. "C" is the theoretical capacity of the battery, "I" is the current, "T" is time, and "n" is the Peukert number, a constant for the given battery. The equation captures the fact that at higher discharge current, there is less available energy in the battery.

pigtail

Wires which protrude from a device to connect it to the circuit. Often used in encapsulated products. Sometimes refers to a method of hooking up circuits in which a group of conductors are connected together and then one wire is connected to the circuit. This is done in order to simplify wiring.

plate (battery)

Flat, typically rectangular components that contain the active material, lead or lead compound, and a mechanical support structure called a grid, which also has an electrical function, carrying electrons to and from the active material. Plates are either positive or negative, depending on the active material they hold.

polarity

Refers to the electrical charge, which may be positive or negative. It also refers to the positive and negative terminals of a battery or load in a DC system. In AC systems it refers to the connections made to the hot and neutral. There is often a reverse polarity light that indicates if the neutral and hot are reversed.

polarized system

An electrical system in which the positive and negative or the hot and neutral must be connected in a particular way and cannot be switched. Sometimes there are mechanical preventions to insure the correct polarity. For example, in an AC plug the physical configuration of the plug and receptacle force a polarized connection.

pole

Indicates a conductive path in a switch or relay. Switches that are single pole have one conductive path, switches that are two pole have two conductive paths. Also refers to the magnetic poles on an electromagnet or a permanent magnet.

potential

The voltage across a circuit element. Implies the potential to do work.

power

Electrical power is the rate at which electrical energy is converted to another form, such as motion, heat, or an electromagnetic field. The common symbol for power is the uppercase letter P. The standard unit is the watt, symbolized by W. In utility circuits, the kilowatt (kW) is often specified instead; 1 kW = 1000W.

Power in a direct current (DC) circuit is equal to the product of the voltage in volts and the current in amperes. This rule also holds for low-frequency

alternating current (AC) circuits in which energy is neither stored nor released. At high AC frequencies, in which energy is stored and released (as well as dissipated or converted), the expression for power is more complex.

In a DC circuit, a source of V volts, delivering I amperes, produces P watts according to the formula: $P = VI$

When a current of I amperes passes through a resistance of R ohms, then the power in watts dissipated or converted by that component is given by: $P = I^2R$

When a potential difference of V volts appears across a component having a resistance of R ohms, then the power in watts dissipated or converted by that component is given by: $P = V^2/R$

power factor

In an AC, circuit loads other than resistance shift the phase angle between the voltage and the current. This shift is the result of energy being stored and released in inductors and capacitors. Since this storage does not represent a consumption of power, a power measurement must take the relative phase of voltage and current into account. The ratio of actual power to the simple product of measured voltage and measured current is called the power factor. Modern electronic devices such as microwave ovens, battery chargers, and computers do not draw current in the same sinusoidal wave shape as the incoming voltage. These distorted wave shapes are also less effective at delivering power and give rise to a power factor less than unity because of the additional frequencies present in the current waveform.

propagation

The transmission of an electrical or electromagnetic signal through a medium such as air or a conductor.

Q, R

RCBO or RCCB

Residual Current Circuit Breaker is a circuit breaker that includes an overcurrent trip mechanism like a conventional breaker and includes a leakage current trip that responds to current returning through a ground path instead of the neutral conductor or the other wires of a circuit with multiple live lines. The principle is the same as a Ground Fault Circuit Interrupter but RCCB's typically have a ground fault limit of 30mA or 100mA instead of 6mA of a GFCI used for personnel protection. GFCI's are generally useful for protecting a single load or a single branch circuit but are too sensitive for use as main circuit breakers. RCCB's are used for main circuit protection in Europe for boats, houses and commercial power distribution. Without this additional protection, as much as 40 Amps can flow in the ground wire, or into the water without tripping a conventional main circuit breaker.

RCD see also Residual Current Device

Recreational Craft Directive - European Directive 94/25-EC relating to recreational craft.

Following are special definitions related to the RCD:

CD

Committee Draft – the first draft circulated for comment by ISO Small Craft Technical Committee Working Group developing the standard.

CEN

The European Committee for Standardization.

DIS

Draft International Standard – an advanced draft where comments on the CD have been taken into account. Minor comments accepted by the Working Group will be incorporated in the FDIS, major changes will result in a second circulation as a DIS.

EN

European Standard (Norme).

FDIS

Final Draft International Standard – the last voting stage where standard bodies can only vote “yes” or “no” and the only changes will be editorial.

ICOMIA

The International Council of Marine Industry Associations – the International Marine Industry Trade Association, which represents 24 national marine industry associations. That includes virtually all countries with an active marine industry in Europe, North America, Asia and Australia. Its officers and members represent its members' views at the EU Commission, ISO, and CEN and its members' representatives are actively involved in all the RSG Standards Working Groups.

ISO

International Standards Organization

PREN

The abbreviation used by CEN to identify a draft standard at any stage.

WG

Working Group – the committee whose members have been nominated by their national standards body to develop any new standard required by the ISO Small Craft Tec. Committee (TC188) one of whom is chosen to act as the Convenor (Chairman/Secretary) by the TC188 members.

LIST OF EUROPEAN UNION (EU) & EUROPEAN ECONOMIC AREA (EEA) NATIONAL STANDARDS BODIES

Austria	ON	Italy	UNI
Belgium	IBN	Luxembourg	ITM
Denmark	DS	Netherlands	NNI
Finland	SFS	Norway*	NSF
France	AFNOR	Portugal	IPQ
Germany	DIN	Spain	AENOR
Greece	ELOT	Sweden	SIS
Iceland*	STRI	Switzerland	SNV
Ireland	NSIA	UK	BSI

* EEA countries – whose national standards bodies are participants in CEN debates, but have a non-voting status.

recognized (UL recognized)

A device that is UL Recognized differs from a device that is UL Listed. A Recognized device is expected to be installed within a larger assembly by a manufacturer, not in the field, and this larger assembly is then expected to be tested by UL. The UL Recognition then allows UL to skip testing of the specific embedded Recognized component. UL Recognition has little value for end users installing devices in the field.

rectifier

A device that allows current to flow in only one direction, such as a diode. Used to convert, or rectify AC current into DC.

regulator (voltage regulator)

A device, which uses a feedback loop to control the output of an alternator or other source. By measuring the output voltage and controlling the alternator field current, for example, the regulator is able to continuously adjust the alternator output to the desired voltage.

reserve capacity (battery)

RC is the number of minutes a new, fully charged battery at 80°F will sustain a discharge load of 25 amps to a cut-off voltage of 1.75 volts per cell (10.5V on 12V battery). This battery rating measures more of a continuous load on the battery.

residual current device

An RCD is an electrical safety device specially designed to immediately switch the electricity off when electricity is “leaking” to earth is detected at a level harmful to electrical equipment. In most countries using 50Hz power, an RCD is considered to provide personnel protection.

An RCD offers a high level of personal protection from electric shock when installed on a boat because the additional grounding through hull fittings is sufficient to trip and RCD during a fault. RCD's offer a backup level of safety if the green ground wire of a shore cable or a galvanic isolator has failed. Fuses or overcurrent circuit breakers do not offer the same level of personal protection against faults involving current flow to earth. RCDs are designed to operate within 10 to 50 milliseconds and to disconnect the electricity supply when they sense harmful leakage, typically 30 milliamps. See also GFI or GFCI devices which are similar in nature, but trip at 5mA for personnel protection. GFCI devices are required by ABYC standards for AC outlets in galleys, on deck and in machinery spaces. These cannot usually be used for the entire system because normal stray currents can cause nuisance tripping.

resistance

The opposition to the flow of current in an electric circuit as defined by Ohm's law. The unit of resistance is the ohm, symbol Ω , the Greek letter Omega.

reverse polarity

Describes a situation where the neutral and hot wires of an AC system are reversed. Most AC panels have an indicator to announce this condition, as it can be very dangerous.

RMS (Root-mean-square)

Root-mean-square (RMS) refers to the most common mathematical method of defining the effective voltage or current of an AC sine wave.

To determine RMS value, three mathematical operations are carried out on the function representing the AC waveform:

(1) The square of the waveform function (usually a sine wave) is determined.

(2) The function resulting from step (1) is averaged over time.

(3) The square root of the function resulting from step (2) is found.

In a circuit whose impedance consists of a pure resistance, the RMS value of an AC wave is often called the effective value or DC-equivalent value. For example, if an AC source of 100 volts RMS is connected across a resistor, and the resulting current causes 50 watts of heat to be dissipated by the resistor, then 50 watts of heat will also be dissipated if a 100-volt DC source is connected to the resistor.

For a sine wave, the RMS value is 0.707 times the peak value, or 0.354 times the peak-to-peak value. Household utility voltages are expressed in RMS terms. A so-called “117-volt” AC circuit has a voltage of about 165 volts peak (pk), or 330 volts peak-to-peak (pk-pk).

S

SAE (Society of Automotive Engineers)

An organization which sets standards for various equipment used in the automotive industry. Since much of the basic equipment used in the marine industry originates in the automotive industry it can be a relevant specifications body for the marine industry as well.

SAE wire gauge

Wire sizes as specified by the SAE, specifically for stranded wire, similar to the AWG, see also AWG. The same gauge in SAE wire has a smaller conductor than in AWG wire.

sacrificial anode

A less noble metal intentionally connected to form a galvanic cell with a more noble metal for the purpose of protecting the more noble metal from corrosion. Most commonly zinc.

safety green (ground) wire

The non-current carrying conductor in a three wire 120V or four wire 240V AC circuit, it provides a safe path for fault current. See also green ground wire.

sealed lead-acid

see *Gel Cell* **self-limiting**

A device whose ability to limit output power regardless of input power is intrinsic to its design.

sheath

A material used as a continuous protective covering around one or more insulated conductors. The ABYC uses this term when discussing the allowable length of a conductor before it must have over current protection. The distance is extended if it is in a sheath.

shore power

AC utility power that is available when plugged into an outlet that is supplied from the main utility system.

short circuit

A conductive path of zero resistance. Typically refers to an unintentional connection between two conductors of opposite polarity. If a voltage is applied to a short circuit the current becomes very large and can start a fire, thus the need for short circuit, or overcurrent, protection in the form of fuses or circuit breakers.

shunt

A shunt resistor is a precise, low Ohm resistor that is temperature stable. It is used as a current "sensor" by using a millivolt meter to measure the voltage drop across it. Large current shunts are commonly made of one or more strips of manganin, a copper alloy capable of carrying high currents, that are soldered between machined blocks of brass with connecting bolts.

Shunts are rated according to the number of Amps they are capable of carrying and the voltage which is generated across the shunt when the rated current is being passed through it. Common shunt ratings include 100A 100mV or 500A 50mV. The resistance can be calculated by using Ohms Law, $V=IR$, $50mV=500A(R)$, therefore $R=0.1m\Omega$, or 0.0001Ω . This is a very small value of resistance; it must be in order to minimize the power loss when large currents are flowing.

The shunt normally has two separate screws with which the sense leads are attached. It is important to realize that the integrity of these connections are critical to accurate measurement and should not be used as current carrying connections.

sine wave

A waveform that can be expressed as the graph of the equation $y = \sin x$. The utility AC power is a sine wave.

single phase

The typical 120/240V AC system in the United States is a single phase system, meaning that the current flow in the two conductors is in phase or that they both cross zero at the same time.

skin effect

Skin effect refers to the phenomena of conductors' propagating AC current more efficiently on the conductors' surface than in its interior.

slow, slow blow see also *Delay*

A fuse that is a slow blow has a longer delay when subjected to over-current, before it fails. Slow blow fuses are required for loads that have high starting surges, like motors.

solenoid (relay)

An electromechanical device that is used to switch large currents. It consists of a coil of wire and a moving contact that makes an electrical connection when the coil of wire is energized.

source isolation (AC)

The arrangement of multiple AC power sources in such a manner that two AC sources cannot be connected to the same circuit simultaneously.

source selector

A switch or breaker configuration, which allows the user to pick which source to have connected to the bus. Typically used in AC systems with multiple sources such as shore power and one or more generators.

speed see *Delay*

Indicates how fast circuit protection devices react, specifically with respect to over circuit breakers and fuses.

square wave

An electrical waveform in which the current quickly goes from zero to its peak value in a step fashion. This is typical of inexpensive inverters.

starting bank

An arrangement of batteries that is designated for the function of engine starting.

storage battery

An electrochemical device capable of storing energy and releasing it and then able to be re-charged and repeat the process.

stray current

Unwanted current flows which occur due to a partial short circuit.

stray current corrosion

Corrosion that results when current from a battery or other external electrical (DC) source causes a metal in contact with an electrolyte to become anodic with respect to another metal in contact with the same electrolyte.

sulfation

Sulfation is the formation or deposit of lead sulfate on the surface and in the pores of the active material of the batteries' lead plates. If the sulfation becomes excessive and forms large crystals on the plates, the battery will not operate efficiently and may not work at all. Common causes of battery sulfation are standing a long time in a discharged condition, operating at excessive temperatures, and prolonged under or over charging.

surge

A large amount of current during the initial starting phase of a motor for example.

surge capacity

The measurement of the ability to withstand surge currents without damage.

surge current see also *Continuous Current*

The pulse of current that is associated with the initial large current required to start an electric motor, large resistive loads, and engine cranking.

switch

An electro-mechanical device that is intended to open an electrical circuit and thus turn a load or source on or off.

switchboard

see *Panelboard*

T

terminal

A connection point or device for an electrical circuit. A terminal strip is a series of screws which may or may not be connected to which wires are connected. Also refers to the connecting device which may be crimped on the end of a wire to enable it to be connected to the circuit with a screw, such as a ring terminal.

terminal studs

A threaded bolt onto which ring terminals may be placed and then fastened with a nut. Normally used for high current connections.

thermal

In a marine context thermal most commonly refers to a thermal circuit breaker, which uses the thermal effect of excess current flow to create differential expansion in a bi-metallic blade to open a circuit.

time-current curve see also *Delay*

A curve which depicts the relationship between the amount of current a fuse or breaker can hold with respect to time before opening the circuit.

tin plating

A plating of the element tin, which prevents corrosion. Commonly used to plate copper components such as a power bus.

toggle see also *Pole*

A switch which has a handle type actuator that can be placed in, at the most, three positions.

transfer switch, AC

see *source selector, Source Isolation*

An electrical relay or manual switch which selects an AC source alternative, such as a generator, shore power, or inverter.

transformer

see *Isolation Transformer*

trip free

A circuit breaker designed to trip when subjected to a fault current, even if the reset lever is held in the ON position.

U, V

ungrounded conductor

Any conductor that is not connected to the Earth ground system

volt (voltage)

The unit of electric potential and electromotive force, equal to the difference of electric potential between two points on a conducting wire carrying a constant current of one ampere when the power dissipated between the points is one watt.

volt-amps

The product of volts and amps, which is watts in a DC system and the apparent power in an AC system.

voltage drop

see *line loss*

W

watt

The unit of power which for a DC circuit is equal to volts times amps.

weatherproof

Constructed or protected so that exposure to the weather will not interfere with successful operation in rain, spray, and splash.

wire amperage rating

The current a conductor can carry under a set of specified conditions such as open air, in an enclosure, and at a specified temperature.

wire sizing

The process of selecting the appropriate sized conductor for the amount of current to be carried while considering the length of the circuit.

withstand voltage

The maximum voltage level that can be applied between circuits or components without causing insulation breakdown.

X, Y, Z

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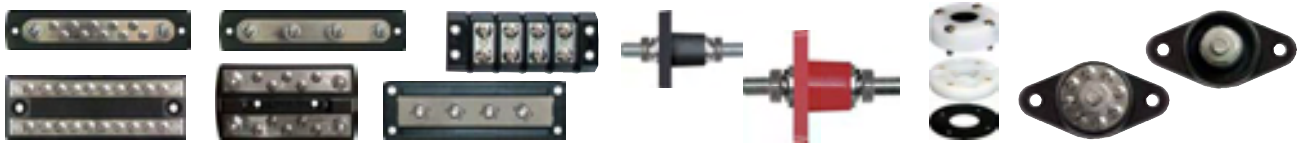
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CONNECTORS AND INSULATORS



FUSE BLOCKS AND FUSES



METERS AND METER ACCESSORIES



PANELS AND PANEL ACCESSORIES



DC MAIN BATTERY MANAGEMENT

DC MAIN CIRCUIT PROTECTION

DC BRANCH POWER DISTRIBUTION
AND CIRCUIT PROTECTION

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