

# AC Rotary Switch

## 2 Positions + OFF, 2 Pole

PN 9009 / PN 9011

### Features

- Switches 2 - 120 V AC Sources or 2 - 230 V AC Sources
- Compact solution when circuit protection is provided elsewhere
- Allows connecting one of two different AC sources to one circuit
- Heavy duty industrial rated switches
- Intuitive function - One handed operation
- UL listed switches

### Specifications

Amperage Rating:	PN 9009 is rated for 32 amp maximum service PN 9011 is rated for 65 amp maximum service	
Voltage Rating:	600 Volts AC Maximum	
Maximum Wire Size:	PN 9009	10 AWG
	PN 9011	6 AWG
Minimum Wire Size:	PN 9009	14 AWG
	PN 9011	12 AWG
Terminal Recommended Torque:		
	PN 9009	12 lb-in.
	PN 9011	40 lb-in.
Overall Dimensions:		
	Inches	Millimeters
	PN 9009	1.890 x 1.890 48.00 x 48.00
	PN 9011	2.520 x 2.520 64.00 x 64.00
Mounting Depth:	PN 9009	1.913 48.60
	PN 9011	2.807 71.30
Maximum Panel Thickness:	0.157	4.00

Document 6670 Rev.B

## ⚠ WARNING ⚠

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

### Guarantee

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

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## Installation

### 1. Disconnect all AC and DC power

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

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

### 2. Select mounting location and cut opening

Select a mounting location which is protected from water on the front and back of the switch and is not in an area where flammable vapors from propane, gas or lead acid batteries accumulate. AC rotary switches are not ignition protected and may ignite such vapors.

Using the template provided, drill the mounting surface where the switch is to be mounted. The mounting surface maximum thickness is 0.157" (4.00mm). Do not yet fasten the switch to the mounting surface.

### 3. Install source 1, source 2 and output wires

Install the feed wires from AC Shore Power and AC Generator. Install the output wires. Refer to the wire sizing chart to select the minimum wire size. Connect the black AC hot, white AC neutral and green AC safety ground as shown in the illustration. To avoid excess wire temperatures when cooling may be limited, we recommend using at least 12 gauge wire for 30A and 8 gauge wire for 50A.

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

A double pole circuit breakers must be installed within 10 feet of the shore power inlet, ahead of this switch. The measurement is made along the conductors.

The switch provides switching, but does not provide circuit protection. It is not a substitute for a main circuit breaker.

### Wire sizing chart

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

**Allowable Amperage of Conductors**

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

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

### 4. Testing

It is very important that the wiring be connected according to the diagram. The line and neutral from each source must be paired together and not connected such that the switch selects line from one source and neutral from another. Verify the connections and see that each connection is securely tightened, including the terminals for the jumpers installed on the switch where no wires are attached.

It is possible to verify the connections using an ohmmeter before power is applied. These procedures take a little time, but are recommended, especially if some elements of a previous installation might not have been properly labeled or followed the expected color codes.

# Installation (continued)

## ✓ Test Shore Connection to Switch

Disconnect the shore power cord from the shore power source and bring the shore plug aboard to a point close to the switch panel. Connect the other end of the shore cord to the boat's power inlet. Turn ON the shore power circuit breaker between the inlet and the selector switch. Set the selector switch to OFF.

- Use an ohmmeter to check for continuity from the shore ground plug to the green wire at the electrical panel.
- Check for continuity from the power cord plug neutral pin to the neutral wire (white typically in US, light blue typically in Europe) at the selector switch. [7]
- Check for continuity between the line pin of the shore plug and the line wire (typically black in US, brown in Europe) at the selector switch. [3]
- Check that there is a high resistance between (>1000 Ohms) the neutral conductor and the grounding conductor.
- Verify that there is a high resistance between (>1000 Ohms) between the shore cord plug neutral pin and line pin. There may be indicator lamps in the circuit, but no more than that with the selector switch in the off position.

## ✓ Verify Switch Selects Shore Input

With the shore cord still disconnected from the shore and available onboard, and the generator set not operating, set the load circuit breakers to off, so there is no load at the output side of the selector switch.

- Verify that there is a high resistance between the line and neutral of the load side terminals of the selector switch. There may be indicator lamps still attached, so it may not read open circuit. [2] to [6]
- Set the selector switch to SHORE. The ohmmeter should still indicate a high resistance.
- Short the line pin to the neutral pin of the shore cord and verify that the line and neutral at the load side of the selector show a low resistance when these are shorted and a high resistance when they are not.

## ✓ Verify the Generator Wiring

Turn the generator circuit breaker to OFF and set the selector switch to the generator position. All load circuit breakers should still be off. Leave the shore input circuit breaker in the on position.

- Verify that there is a high resistance (>1000 Ohms) from the line to neutral. [2] to [6]
- Verify that there is a low resistance from the neutral to ground at the load connections. [6] to [ground]
- With the generator still not running, close the generator circuit breaker at the generator. Verify that there is a now a low resistance from line to neutral where the generator windings are now connected across the circuit.
- Verify that there is still a high resistance from neutral to ground and neutral to line at the shore power plug.

- ✓ Set the Selector switch to **OFF**, turn the shore power breaker to **OFF**, and leave the load panel circuit breakers in the **OFF** position. Complete the mounting of the switch.

Set your multimeter to volts.

## ✓ Test Shore Power

Connect the shore power cable to the shore power source. Turn on the shore source to make power available to the boat.

- Turn the selector switch to **SHORE**. No Reverse Polarity lights should be lit, and power available should be indicated. If any red Reverse Polarity lights are on, turn off the shore power circuit breaker and disconnect the shore cord at the shore source. Either the hot and neutral or hot and ground wires have been reversed. Starting at the distribution panel, trace the connections as far back as necessary to locate the error.
- If there are no indications of reverse polarity, check to see that power is available. If the electrical distribution panel has a meter, verify that shore power is available and at the proper voltage. If there is no meter, turn on the load circuit breaker for an AC circuit powering a convenience outlet and use a voltmeter to verify that power is available from line to neutral at the plug. Verify that there is no voltage between ground and neutral.

## ✓ Test Generator System

Turn the circuit breaker at the shore source to **OFF**. Set the selector switch to **OFF**. The shore power available lights should all be off. Start the generator and turn the generator breaker to **ON**.

- If there are power available lights for the generator output, they should light.
- There should be no power available indication at the shore power circuit breaker.
- Set the selector switch to **GENERATOR**. Power should be available at the power distribution panel. If the electrical distribution panel has a meter, verify that power is available and at the proper voltage.
- There should be no power available lights indicating at the shore circuit breaker.

## The Purpose of the AC Main Source Selector Panel

Alternating Current (AC) power changes polarity 60 times per second in the US, Canada and Latin America and 50 times per second in Europe. This is the frequency of the power and is referred to as Hertz (or the now outdated term "cycle"). Because of this alternating nature of AC power, two live sources of AC power, such as shore power and inverter power, or shore power and a generator, cannot be electrically connected. The AC Main Source Selector panel is designed to connect two sources of AC power to a common circuit while preventing both sources from being connected to the circuit simultaneously.

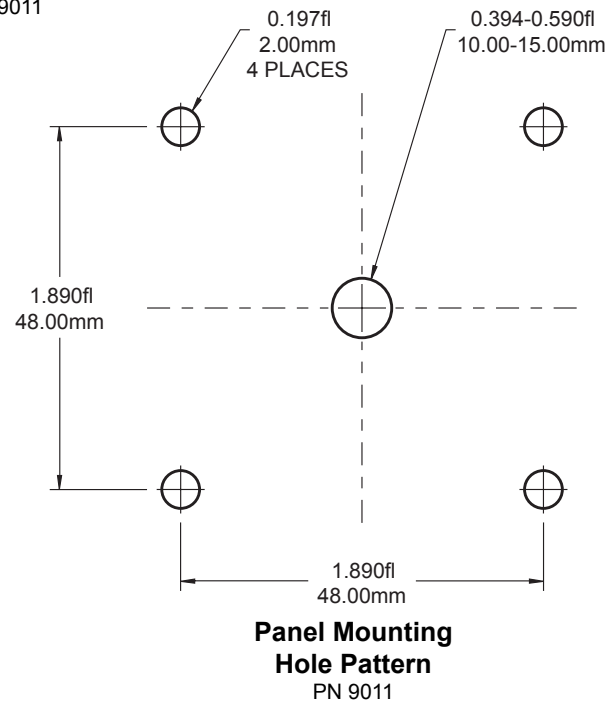
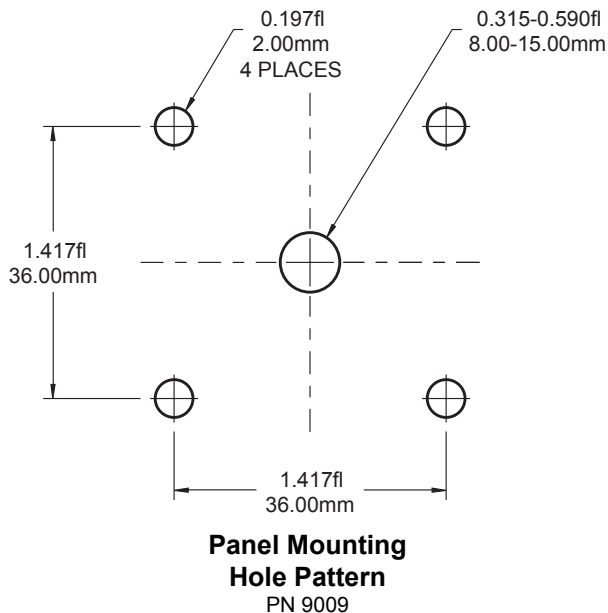
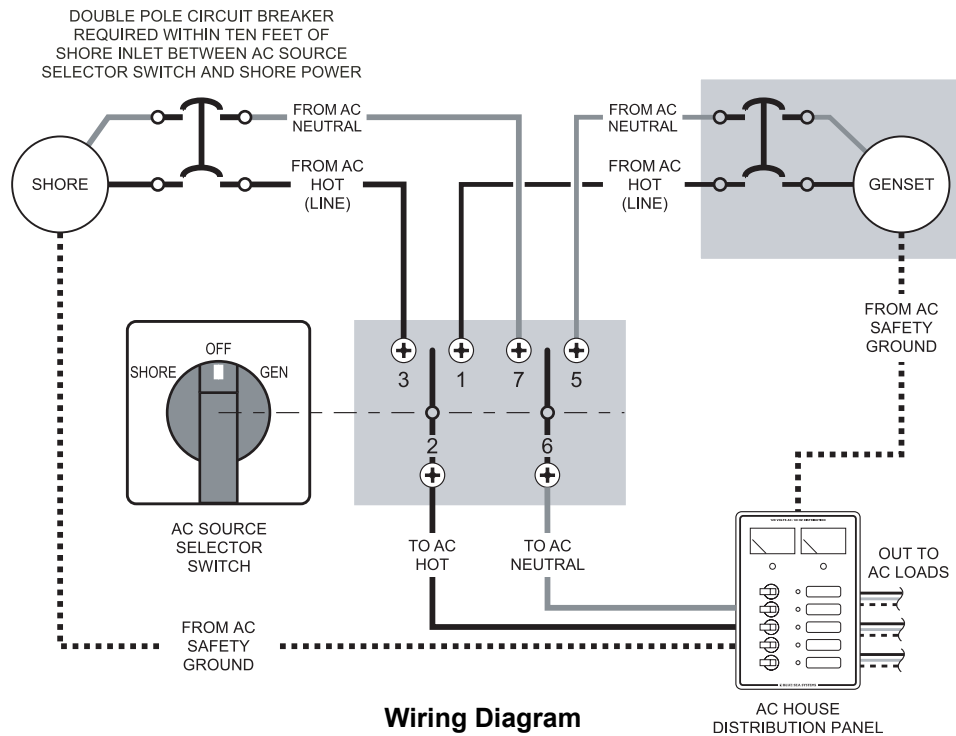
## Related Products from Blue Sea Systems

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

## Useful Reference Books

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

# Installation (continued)



Part Number	L	
	Inches	Millimeters
9009	0.35	9
9010	0.35	9
9011	0.60	15
9019	0.60	15
9077	0.60	15
9093	0.60	15

Wire Strip Length

