

# Analog DC Ammeters with External Shunt

0-50A, 0-75A, 0-100A,  
0-150A, 0-200A

## Meter Specifications

Voltage:	DC		
Amperage Draw:	1 Milliamp at full scale		
Display:	Analog scale		
Accuracy:	3% of scale range		
	<b>Size</b>	<b>Inches</b>	<b>Millimeters</b>
Face Width:	Micro Meter	2	50.80
	Standard Meter	2-5/8	66.50
Mounting Hole:	Micro Meter	1-1/2	38.10
	Standard Meter	1-7/8	47.60

## Calibration

The Ammeters are calibrated at the factory.

## 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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# Wire Sizing Chart

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

## Example

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

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

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

Chart courtesy of the West Advisor

# Installation

## 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 recommend that an electrical professional be retained to make the installation.

### 1. Disconnect all AC and DC power

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

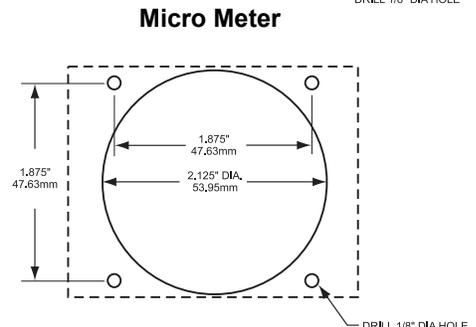
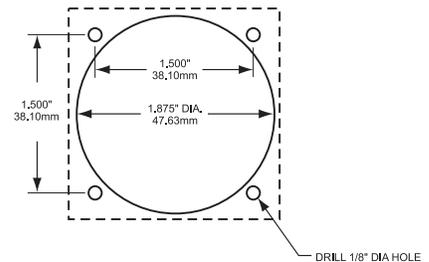
### 2. Select mounting location and cut opening

Select a location for the meter display which is protected from water on the meter front and back and is not in an area where flammable vapors from propane, gas or lead acid batteries accumulate. The meters used in marine electrical panels are not ignition protected and may ignite such vapors.

Choose a convenient point in the circuit to be measured to locate the shunt. It should be located where it and the associated wiring will be protected from physical damage and it is protected from accidental contact with grounded metal. The shunt may be located at any point in the circuit, but mounting it closer to the meter location will keep the sense wires short, minimizing voltage loss and interference, creating the most accurate meter reading. Where a long run may be required, interference can be minimized by using twisted pairs of conductors. There are two mounting methods for the Ammeters

**2.1. Surface Mount:** Drill five clearance holes as shown below. The size of the meter will determine the size and location of the clearance holes. Use the nuts and washers supplied in the accessory package to secure the four mounting studs to the mounting surface. This method will work on mounting surfaces up to 5/8" thick.

**2.2. Panel Mount:** For thicker mounting surfaces, the meter can be mounted into a 0.125" thick panel. Blue Sea Systems offers meter mounting panels for our standard size meters only. Use part number 8013 to mount a single meter or part number 8014 to mount two meters.



Standard Meter

# Installation (continued)

## 3. Connection

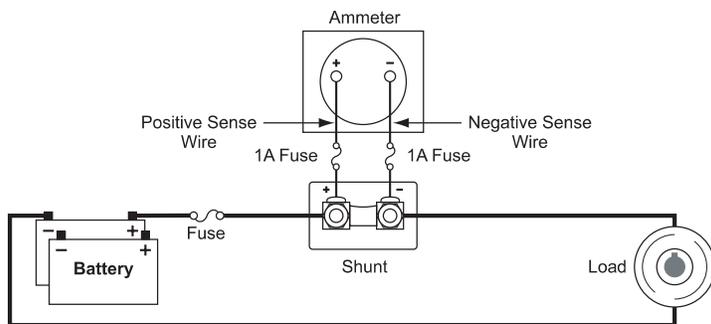
Blue Sea Systems Ammeters of 50 Ampere and greater capacity utilize an external shunt as the current sensing device. This shunt can be located in the wiring system to permit the shortest and most direct path between the source and the load. Small gauge wires connect from the shunt to the meter, which can be located conveniently for viewing.

Break the circuit to be measured at the location for the shunt and install the shunt by connecting the ends of the load circuit wire to each of the two large stud terminals at the top of the shunt. Connections should be made with properly crimped ring terminals of a size suited to the wire and the bolt size of the shunt. It makes no difference which wire is attached to which terminal. Ring terminals for these connections should rest directly on the brass blocks of the shunt without any washers in between.

Next, using a minimum of 16 AWG individual conductors or a multiconductor assembly, route a pair of wires to the meter location. If the shunt is in the non-grounded (usually positive) side of the circuit, over current protection is required for both sense wires. Place a 1A fuse in series with each sense wire conductor within 7 inches of the shunt near the shunt connections and identify as positive the wire to be attached to the shunt near the main conductor coming from the source. Identify as negative the conductor connected nearest the load. Attach the sense leads to the smaller screw terminals on the brass blocks of the shunt using properly crimped ring terminals. Do not stack these connections on the large screws with the main circuit conductors.

Attach the conductor identified as positive to the positive terminal on the meter back and the conductor identified as negative to the negative terminal on the meter back using properly crimped ring terminals.

If desired, additional meters may be placed in other convenient locations and connected to the same shunt. A second shunt is not necessary in multiple meter installations if the intention is to read the same current at the same maximum scale factor.



**Wiring Diagram**  
DC Ammeter

## 4. Wire Size

**Signal wires:** The meter movement requires only 1 mA of current to operate. ABYC recommends 16 AWG conductors to assure adequate physical strength. Smaller conductors may be used if part of a multiconductor cable such as a shielded twisted pair signal cable.

**Load Conductors:** The load carrying conductors should be sized to provide sufficient wire size for both wire heating and voltage drop. No change in wire size is required because of installing the meter unless the total length of the wiring path is substantially increased to locate the shunt in a safe location. Refer to the wire sizing chart in this document or see ABYC E-11, Table IV for minimum conductor sizes. In 12V DC systems wire sizes are frequently chosen to be larger than the minimum to provide acceptable voltage drop.

## Available Meters

PN	Description	PN	Description
8005	0-25A DC Ammeter	8003	8-16V DC Voltmeter
8022	0-50A DC Ammeter	8028	8-16V DC Micro Voltmeter
8016	0-75A DC Ammeter	8240	18-32V DC Voltmeter
8017	0-100A DC Ammeter	8243	18-32V DC Micro Voltmeter
8018	0-150A DC Ammeter	8038	0-15 A DC Micro Ammeter
8019	0-200A DC Ammeter	8041	0-50 A DC Micro Ammeter
9353	0-150V AC Voltmeter	8250	0-100A DC Micro Ammeter
9630	0-50A AC Ammeter		

## Related Products from Blue Sea Systems

- PanelBack Insulating Covers
- 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 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.