PANELS WITH DMM-1 INSTALLATION MANUAL

Thank you for your purchase of a Microlog Technologies product. Your new Distribution panel include our Microlog DMM-1 Battery Monitor, a digital instrument that precisely measures the state of your DC system and batteries in Boats or Recreational Vehicles(RV's).

Panel Specifications:
Material: 0.125" 6061-T6 Aluminum Alloy for Deluxe panels
Panel Finish: Black textured Epoxy paint.
Voltage Rating: 12 VDC
Amperage Rating: Bus Bars: 100A,
up to 12, or 20/ 15 Ampere A-Series branch circuit breakers
(installed according to American Boat and Yacht Council (ABYC) Standards and Recommended Practices for Small Craft sections: E-1, E-3, E-9).
Deluxe panels have Identification LEDs on each circuits.
Overall Dimensions: 12DC-DMM: 7.5" x 9" / 19.0cm x 22.9cm . 20DC-DMM: 10.75" x 9" / 27.3cm x 22.9cm

WARNING

It is not possible within the scope of these instructions to fully acquaint the installer with all the knowledge of electrical systems that may be necessary to correctly install this product. If the installer is not knowledgeable in electrical systems we strongly recommend that an electrical professional be retained to make the installation. If either the panel front or back is to be exposed to water it must be protected with a waterproof shield.
The panels must not be installed in explosive environments such as gas engine rooms or battery compartments as the circuit breakers are not ignition proof.
The main positive DC connection must be disconnected at the battery post to avoid the possibility of a short circuit during the installation of this distribution panel.

PANEL INSTALLATION

1- **Verify that the standard circuit breakers installed in the panel are correct for each branch circuit. Remove and replace any that are incorrectly sized. The circuit breaker must have a rating less than the allowable amperage of the wire, yet greater than the circuit's continuous current.** Remove breakers holding bars to install extra breakers you ordered. Slightly take the breaker group out of position (AVOID PULLING RED LED WIRES TOO MUCH) to remove the replaced breaker. Replace bars.

2- 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 if AC panel close to DC panel. DISCONNECT THE MAIN PANEL DC POSITIVE cable from batteries to eliminate the possibility of a short circuit and to disable the inverter while installing the new distribution panel.

WARNING: BE CAREFUL TO PREVENT SHORT-CIRCUIT WITH MAIN WIRING, CONNECT THE MAIN POSITIVE LAST WHEN YOU ARE SURE YOU DID CONNECT EVERYTHING THE RIGHT WAY.

3- Select mounting location. The Panel must be located inside the boat or vehicle in order to protect it from weather damage. Choose a location, which is accessible, close to navigational equipment. Be sure to have sufficient space behind the panel to allow wire leads to be connected easily. Select a mounting location which is not in an area where flammable vapors from propane, gasoline or lead acid batteries accumulate. The circuit breakers used in marine electrical panels are not ignition protected and may ignite such vapors. Cut opening using the panel template provided, in the mounting surface where the distribution panel is to be mounted. Do not fasten the panel to the mounting surface yet.

4- Remove the Main DC wiring if it need to be changed and install the new Main DC Wiring from battery compartment to the panel. **We strongly suggest you install a MAIN SWITCH WITH FUSE OR BREAKER on the Positive(+) close to the battery bank.** Determine the proper wire size using the chart below:

WIRE SIZE		CM AREA		OHMS	AMPA CITY		CIRCUIT AMPS							
AWG	METRIC	AWG	SAE	/1000 FT.	BOAT	ENGINE	5	10	15	25	50	75	100	125
							Max total length of 105°C wire for 3% drop, 12Volts, in Ft.							
#18	0.8	1610	1537	6.385	20	17	10.8	5.4	3.6					
#16	1	2580	2336	4.016	25	21.3	17.2	8.6	5.7	3.4				
#14	2	4110	3702	2.525	35	29.8	27.6	13.8	9.2	5.5				
#12	3	6530	5833	1.588	45	38.3	43.8	21.9	14.6	8.8				
#10	5	10380	9343	0.9989	60	51	69.6	34.8	23.2	13.9	7.0			
#8	8	16510	14810	0.6282	80	68	110.6	55.3	36.9	22.1	11.1			
#6	13	26240	24538	0.3951	120	102	175.8	87.9	58.6	35.2	17.6	11.7	8.8	
#4	19	41740	37360	0.2485	160	136	279.6	139.8	93.2	55.9	28.0	18.6	14.0	11.2
#2	32	66360	62450	0.1563	210	178.5	444.4	222.2	148.1	88.9	44.4	29.6	22.2	17.8
#1	40	83690	77790	0.1239	245	208	560.6	280.3	186.9	112.1	56.1	37.4	28.0	22.4
#0	50	105600	98980	0.09827	285	242.3	707.2	353.6	235.7	141.4	70.7	47.1	35.4	28.3
#00	62	133100	125100	0.07793	330	280.5	891.4	445.7	297.1	178.3	89.1	59.4	44.6	35.7
#000	81	167800	158600	0.0618	385	327.3	1123.8	561.9	374.6	224.8	112.4	74.9	56.2	45.0
#0000	103	211600	205500	0.04901	445	378	1417.6	708.8	472.5	283.5	141.8	94.5	70.9	56.7

NOTES: Total wire length include positive and negative wiring length to the device, Length x 2 for 24 volts, Ft. / 3.3 for meters

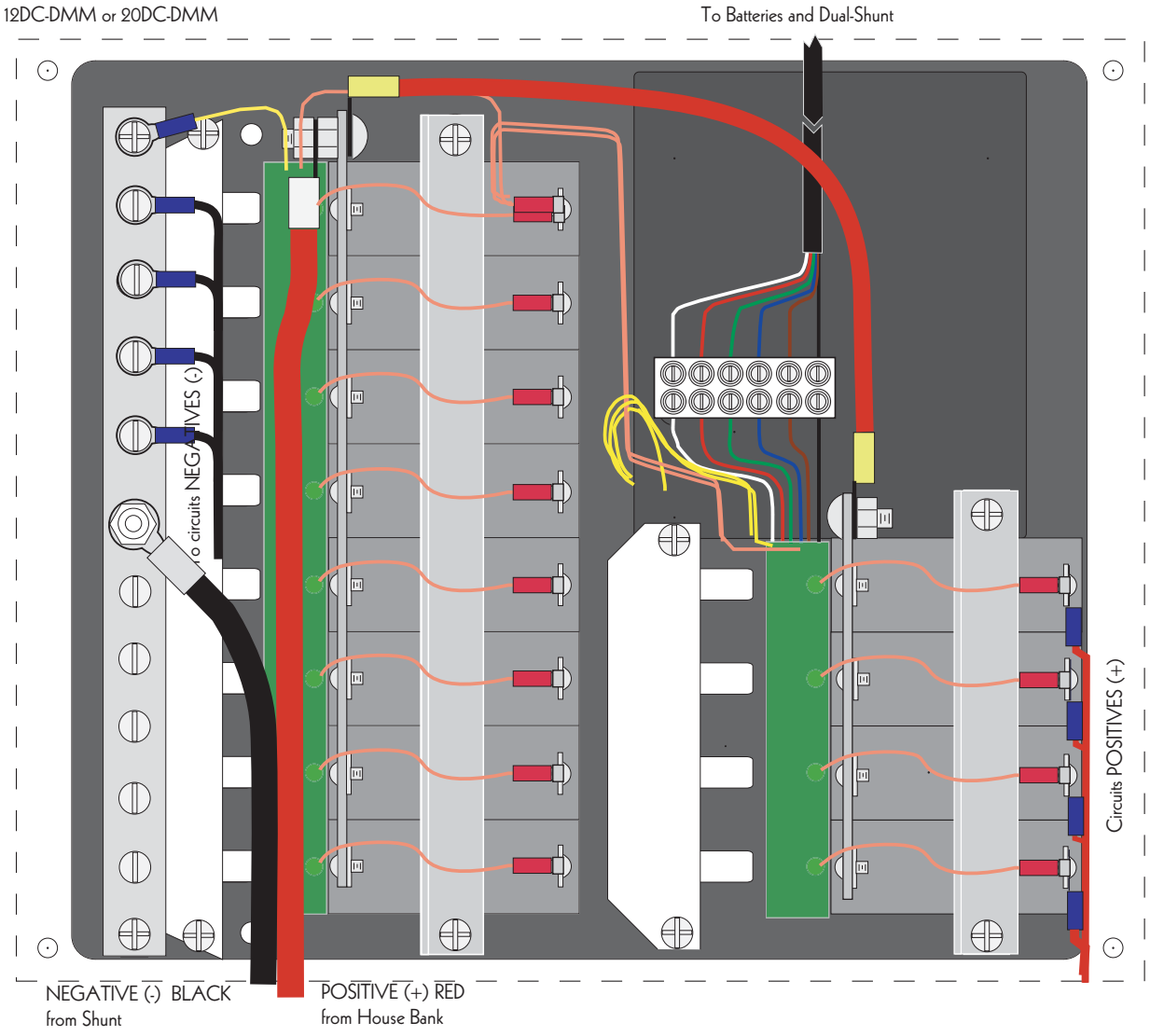
Determine the Main positive feed (red) and negative return (black or yellow) wire size by calculating the total amperage of the circuits that will be routed through the

panel. Our panels are rated at 100 amp per bus total capacity, it is then recommended that the Main feed wires be sized for the full panel capacity. For a 3% voltage drop at the 100 amp panel rating, for example, will require at least #2 AWG wire, assuming a 22 feet total wire run between the panel and the batteries in 12 volt systems. The length of the wiring is the total of the Positive wire from the power source and the negative wire back to the DC Negative source. Be sure to install a fuse or circuit breaker of the correct size protecting the positive feed wire close to the battery. Refer to the Wire Sizing Chart for other situations.
You should install High-AMP devices like winlass or power inverter on separate circuits with breaker or fuse protection close to the batteries.
DO NOT CONNECT MAIN POSITIVE(+) ON THE MAIN SWITCH OR BATTERIES YET.

5- Install branch circuit wires. Verify that the standard 15 amp circuit breakers installed in the panel are correct for each branch circuit. Remove and replace breakers with correct amperage. You can use the previous wire chart for each individual circuit wiring size and length. Connect the positive (red) branch circuit wires to the load terminals (right) of each circuit breaker. Do not forget the small LED's wires. Connect each negative (black) branch circuit wire to the DC Negative Bus. We suggest you install Panel Backlight Orange wires on the same breaker as "Cabin". Do not use wiring smaller than #18 AWG. DO NOT ATTACH ANYTHING ON THE LED'S WIRES.

6- Install MAIN wiring on panel,: Connect Negative (-) to your DC panel, tighten NUTS for good contact. Connect the Main Positive(+) to the panel on the main Bus Bar sitting on the Breakers. You can proceed installation in Battery compartment as per proposed following schematics for DMM-1 installation. This installation may include Shunts to measure current as described in the following pages but you can connect the Negative (-) wire to the Battery negative to test the panel.

To test your system: Reconnect or connect the main positive (+) DC cable to the MAIN SWITCH/FUSE OR BREAKER and turn it ON to supply power to the panel. Turn on all branch circuits and test the voltage at the panel. Compare this voltage to the battery terminal voltage to determine that the voltage drop is within 3%. With
all branch circuits still on, test the voltage at one device on each circuit to determine that there is a 3% or 10% drop as is appropriate.



Installation layout for 12DC-DMM or 20DC-DMM

DMM-1 INSTALLATION

The Microlog DMM-1 Battery/DC System Monitor is a digital instrument that precisely measures the state of batteries in boats and recreational vehicles (RV'S). Precision digital monitoring allows a more accurate battery status reading and therefore delivers the necessary data to manage electrical resources more efficiently. In challenging circumstances, such as at sea, this information may be crucial in making important decisions. The system is designed to monitor the voltage status of up to two batteries or battery banks, current flow of charging devices and separate equipment current consumption. It does not count Amp-Hours. An integrated alarm system is also included, sending a warning signal, should the voltage of any battery fall under 11.8 volts or exceed 15.1 volts, while charging. The Microlog DMM-1 system is made with the finest components and materials in order to optimize its reliability and performance.

A typical boat 12 Volt system include two batteries: one battery (battery bank or house bank) is usually assigned to feed electrical appliances (fridge, lighting etc..), the second battery is dedicated to start the engine (See typical installation in Figure 1). Some boats can have two house banks and two engine batteries. RV's may include one engine battery, one generator battery and two house banks. The DMM-1, in those situations, should be assigned to monitor the two house banks, as those ones will likely be subject to deep discharge. Each DMM-1 Battery input can measures Voltage levels of one individual battery or one bank of several batteries. Total charging or discharging current to be measured, is passed through the "Shunts".

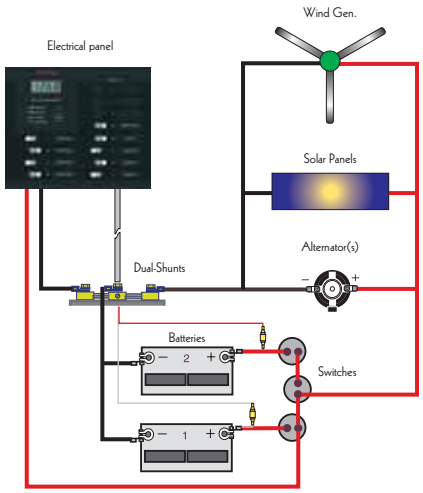
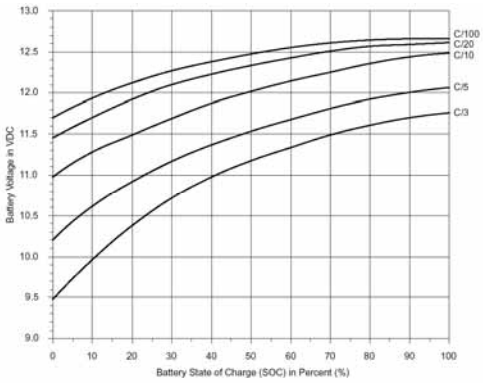


Figure 1:Typical installation

Measuring Voltage:

Measuring Specific gravity of the battery electrolyte (acid+water) in each cell of a lead-acid battery with caps will tell the level of charge but it can be messy and is not an easy task. Voltage indication is also a prime way to learn the status of charge of your batteries. This voltage also corresponds to the level of specific gravity related to any given level of charge. A Lead-Acid Battery voltage level of 11.7 Volts at rest (no load or charging device), indicates a completely discharged battery, while a voltage level of 12.60 Volts (12.95 Volts/Gel-cell), without any charging device connected, indicate a full charged battery (at room temperature). Any battery that discharges often below 11.6 volts (50%, under load) will eventually shortens its service life. The typical status of charge of your batteries is shown in the following table and chart, readings will vary with type and capacity of your batteries:

Percent of charge	Battery Voltage at rest (no load or charging device)			Lead-acid Battery Voltage (under load, C/10 no charging device)	Specific Gravity
	Lead-acid	Gel-Cell	AGM		
100%	12.60 V	12.95 V	12.80 V	12.50 V	1.255-1.275
75%	12.42 V	12.65 V	12.60 V	12.30 V	1.215-1.235
50%	12.18 V	12.35 V	12.30 V	12.05 V	1.200-1.180
25%	12.00 V	12.00 V	12.00 V	11.60 V	1.165-1.155
0%	11.70 V	11.80V	11.80 V	11.00V	1.130-1.110



Typical Battery Voltage vs % of charge chart at 77°F (25°C) (according to a major battery manufacturer)

Measuring Current::

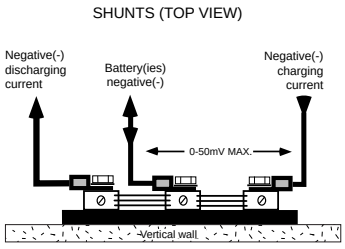


Figure 2: Typical current flow in shunts

The Microlog DMM-1 has 2 separate current measurement circuits, one circuit for charge current and one for discharge current. Our instrument does not measure AMP-HOUR type of readings. It rather measure the actual current produced by the charging equipment and, separately, the current consumed by electrical devices on board. Current measurement is determined by creating a very small voltage drop (0 to .050 Volts maximum) in a dual shunt (included in the accessory kit) connected to the negative side of charging and/or discharging devices. Your DMM-1 instrument is measuring this small voltage drop on the shunts and convert this measurement to display a current reading. Measuring these slight variations in voltage is critical in order to achieve an accurate reading. All measured current MUST pass through the shunts. Current flow is indicated by a + or - sign.

The different Battery Charging Stages can be monitored with your DMM-1:

1-The BULK stage of charging is the first stage and the AMP level will be equal to the maximum output delivered by your charging equipment or between 25-40% of your Amp-Hour battery capacity (also limited by the maximum output of the charging equipment). A typical Alternator will deliver 38-60 Amps (gradually decreasing) to a 150 Amp-Hour (AH) battery. You will get 75% of your battery charge with this stage. The voltage will be higher than the preceding Typical Battery voltage chart.

2-The second stage called Absorption stage will provide the remaining 25% of charge to the battery (ies) where they will be considered fully charged with a remaining current of 2-4% of the AH battery capacity (3-6 Amps, with a 150 Amp-Hour (AH) battery, on the DMM-1 charge mode) with a voltage of 14.4 Volts (14.2 for gels). This stage is slower as the current is lower and some people will stop charging stage before the 2-4% of the AH battery capacity point has been reached.

3-The Float Phase stage will maintain the battery charge after the full charge point has been reached.

4-The Equalization stage is optional on some battery chargers and allows you to de-sulphatize your batteries with a higher voltage.

The alternator, or other charging devices, will raise the battery (ies) voltage to 14.4 Volts. This voltage information combined with the level of current supplied will tell you when you have reached the full charge status.

IMPORTANT WARNING: The DMM-1 internal circuit is protected from short circuits by an automatic internal breaker, but the wiring connected to the battery terminal (s) is not protected unless a fuse or thermistor is installed. YOU MUST install 0.25 Amp. (max.) fuses or thermistors on the monitoring + (white and red) leads connected close to the batteries positives (+) terminals for added short and FIRE PROTECTION.

A-INSTALLING THE DMM-1 FOR VOLTAGE MEASUREMENT ONLY (WITHOUT SHUNTS)

Figure 3 illustrates the proper wiring installation of the DMM-1 unit (without shunts) for voltage measurement and alarms only. The following steps will guide you through the procedures. Your DMM-1 is calibrated with a length of 25 feet of #18 special cable (included in our accessory kits) and we suggest to use the full length of cable for maximum accuracy.

1-Link all the negative battery terminals together (may be already done), with heavy gauge wire, to create a common negative point (-) (see figure 3).

2-Connect the BLACK, BROWN, GREEN and BLUE wires together to the common negative point (-) (at the instrument terminal strips if you do not use our special cable). Note: the separate ground wire (black) and sensor negative wire (brown) are designed to increase the instrument's reliability and accuracy.

3-Connect the RED wire from the DMM-1 unit to the #2 battery through the thermistor or fuse.

4-Connect the heavier gauge WHITE wire from the DMM-1 unit to the positive (+) battery terminal of the #1 battery through the thermistor or fuse. This wire is also used to feed power to the DMM-1 instrument.

Should you wish to monitor the status of only one particular battery, connect the WHITE and RED leads to the positive terminal of that battery.

Screw	Connect to	Wire Color
#1	Battery Negatives -	Black
#2	Battery Negatives -	Brown
#3	Battery Negatives -	Blue
#4	Battery Negatives -	Green
#5	+12V/Bat.#2(+#3)	Red
#6	+12V/Bat.#1	White

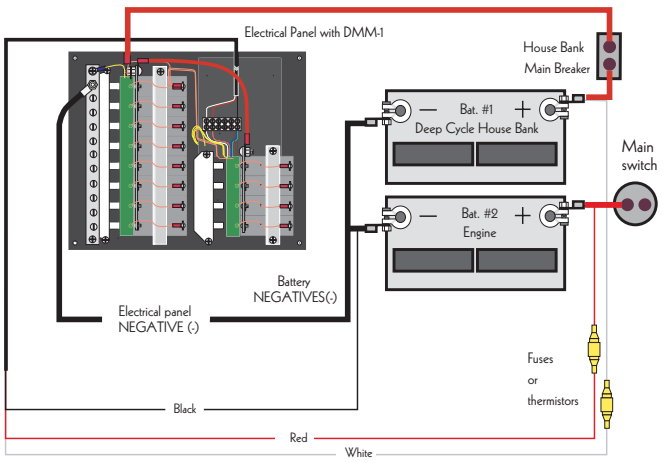


Figure 3: Installation without shunts

B-INSTALLING THE DMM-1 WITH DUAL-SHUNTS

IMPORTANT WARNING: IMPORTANT WARNING: Some boat and most RV's alternators have their NEGATIVE output connected to the alternator casing and engine mass instead of having a separate negative post. Engine starters are also connected the same way. If you connect the engine negative mass wire to the charge shunt and then to the starting battery, this could lead to excessive current (over 200Amp.) through the shunt. When you start big engines (more than 4 cylinders) for more than a few seconds, you may possibly damage the shunt and prevent the engine from starting. It is therefore very important, in this case, to have an Alternator NEGATIVE output isolated from engine mass or only measure the House bank(s) charge and discharge current (as installed according to fig. 6) so high starting surge current will not pass through the shunts. Under NO circumstances the House Banks will then be used to start big engines.

Figure 4, 5, and 6 illustrate the correct installation of the DMM-1 unit with Dual-Shunts. The following steps will guide you through the proper procedures.

Figure 5 show the best installation diagram if you have Alternator (s) Negative (s) (-) Output(s) ISOLATED from the Engine (s) Mass.

If it is not possible to have a separate Negative (-) Output (s) from the alternator (s), you can use the Figure 5 Installation for small Engines with 4 cylinders and less, only, where you have Alternator Negative (-) Output connected to the Engine Mass. You install as in following steps except you will monitor alternator output through the shunt, installed inline with the Black Engine Mass Cable.

Figure 6 show the installation diagram for Single or Dual Engines with more than 4 cylinders in Powerboats and RV's, where you have Alternator(s) Negative(s) (-) Output(s) connected to the Engine(s) Mass. and you cannot have them isolated. You install as in following steps except you will monitor alternator output and charging equipment to the Deep cycle Batteries or House banks only.

The following steps will guide you through the proper procedures:

Your DMM-1 has been calibrated with 25 feet (7.5 meter) of our special cable. We suggest using the full length of cable for maximum accuracy.

1- The Dual-Shunt MUST be mounted horizontally on a vertical wall to ensure the proper ventilation and cooling of the small shunt plates (see figure 4).

2- Your Dual-Shunt has a center bolt which will act as a Common Negative Point (-) (see figure 4). Connect the negative (-) terminal(s) of the battery (ies) to be monitored for current flow, to the Common Negative Point. Use heavy gauge wiring to ensure good conductivity and provide heat dissipation. DO NOT OVER-TIGHTEN BOLTS ON BRASS SHUNTS AS YOU MAY DAMAGE THEM.

3- See Table 3 for wiring installation. All monitored 12 volt charging equipment NEGATIVE (-) wires should now be connected to the charging shunt bolt (RIGHT).

4- The electrical distribution panel NEGATIVE (-) should be connected to the discharging shunt bolt (LEFT).

5-Connect the BLACK and BROWN wires from the DMM-1 unit cable to the small screw on the center mount on dual-shunt.

6- Connect the BLUE wire from the DMM-1 unit to the small screw on the discharging shunt mount (LEFT) which is linked to the discharging equipment or electrical panel NEGATIVE (-).

7- Connect the GREEN wire from the DMM-1 unit to the small screw on the charging shunt mount (RIGHT) which is linked to the charging equipment NEGATIVE (-).

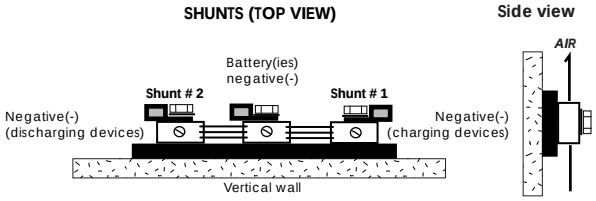


Figure 4: Dual Shunts Physical installation

8- Connect the RED wire from the DMM-1 unit to the #2 battery (or battery bank) or starter battery through the Thermistor or Fuse.

9- Connect the WHITE wire from the DMM-1 unit to the positive (+) battery terminal of the #1 battery through the Thermistor or Fuse. This wire is also used to feed power to the DMM-1 instrument.

Note: If you are only using only one battery, combine the DMM-1's WHITE and RED wires together to the positive (+) battery terminal.

Screw	Connect to	Wire Color
#1	Dual shunt center (- negative)	Black
#2	Dual shunt center(- negative)	Brown
#3	Discharge shunt (- negative)	Blue
#4	Charge shunt (- negative)	Green
#5	+12V/Bat.#2(+#3)	Red
#6	+12V/Bat.#1	White

Table 3: Wiring installation

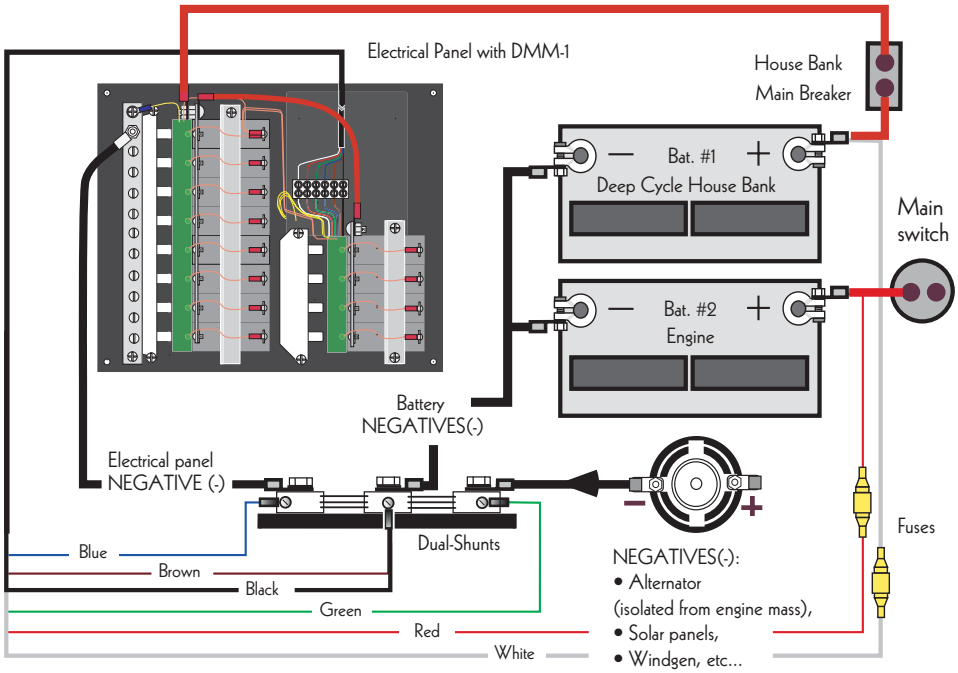


Figure 5: Installation for separate from mass alternator Negative(-)

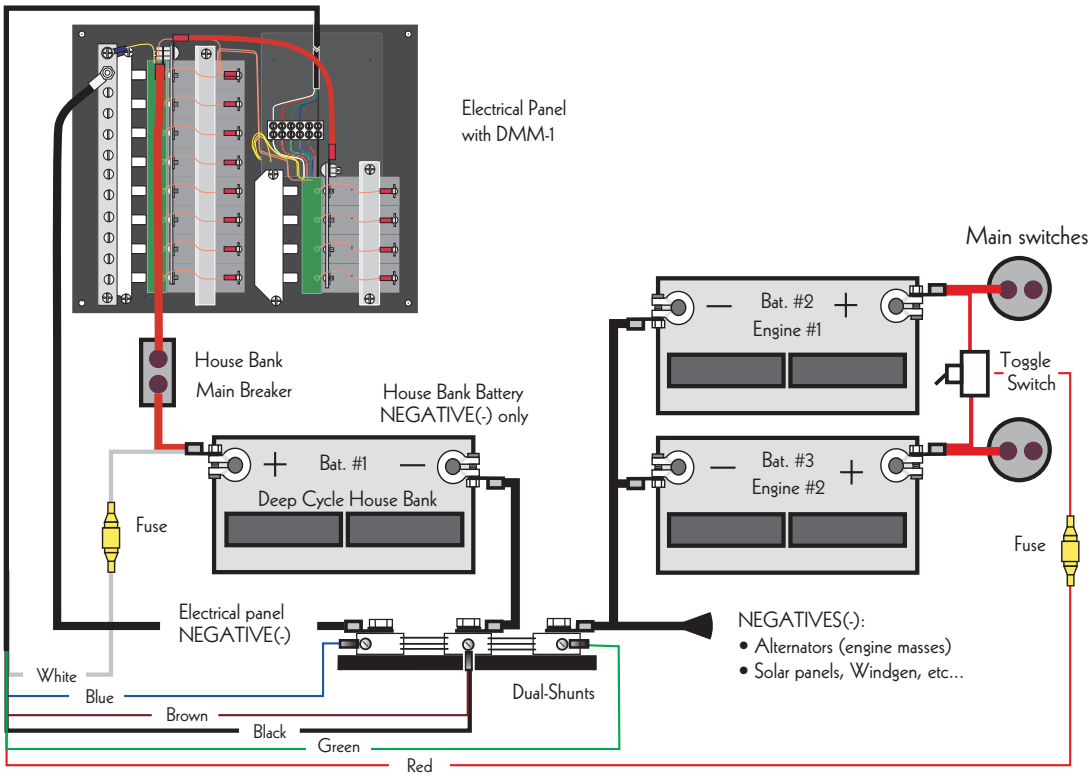


Figure 6: Dual or Single big engine(Power Boat or RV) DMM-1 Shunts and wiring installation where alternator(s) negative(s) is connected to the engine(s) mass(es)

TEST AND OPERATION

•If the DMM-1 display is blank, press on the MODE button to activate the unit.

The Operation Modes:

• There are four monitoring modes, which can displayed (battery 1, battery 2, charge and discharge).

Use the MODE button to toggle through these choices. An indicator light will appear on the selected mode:

• Battery 1 : monitors the voltage of the first battery.

• Battery 2 : monitors the voltage of the second battery.

• Charge : monitors the current in AMPERES (AMPS) of the charging circuit.

• Discharge : monitors the load current of appliances and equipment running on the batteries.

• Off : a fifth mode position, the OFF mode, deselects the above modes and alarms are disabled.

This unit features a high and low voltage alarm which once triggered sends a visual (LED) signal as well as an audio signal. When an alarm condition occurs, each battery bank can be verified for it's respective condition. The alarm is triggered when any battery bank is under 11.8 Volts or over 15.1 Volts. This IS NOT related to the chosen mode. You must put the DMM-1 in OFF MODE to deactivate the Beeper and correct the situation.

TROUBLESHOOTING

The DMM-1 displays inaccurate voltage readings:

• Verify that the BLACK and BROWN leads from the DMM-1 are not contacting any other leads. Their ONLY contact must be the small screw located on the center dual-shunt mount or the battery common negative point on batteries if you are not using shunts.

• Your DMM-1 is calibrated with 25 feet of our special cable and we suggest using full length of cable and our Dual-Shunt for maximum accuracy.

• Your VHF or SSB can induce your DMM-1 through the wiring network and increase the voltage reading slightly when transmitting.

• Some battery chargers and AC power lines or connected equipment can induce noise-affecting readings of DMM-1.

The DMM-1 displays inaccurate current readings:

Problems can arise when monitoring current as the DMM-1 measure very small voltage drop in shunts.

• Verify shunt installation for loose wiring and ensure that the all heavy wire gauge is well connected and bolted to the shunts.

• Verify that the black, blue, green and brown leads from the DMM-1 are well connected to shunts and at the DMM-1 instrument.

• Your DMM-1 is calibrated with 25 feet of our special cable and we suggest using full length of cable and our Dual-Shunt for maximum accuracy.

• You may have equipment (s) negative (-) (s) which are not connected to the Distribution Panel discharge shunt but rather on the Engine mass, boat keel or hull or RV frame instead. All the measured current must pass through the Charge and Discharge Shunts in line with the Negative Battery Wiring. The slightest leak between the alternator, chargers NEGATIVES or engine mass, connected to the charge shunt, and any discharging devices can cause errors or falsify readings of the separate charging or discharging circuits. It is therefore very important to have wiring connected as in Figure 5, 6 or 7.

• The VHF radio antenna that is installed atop the mast of sailboats may also cause current leaks. The coaxial cable brings the negative to the antenna, then to the mast, then to the lightning grounding path including the engine and the un-insulated alternator case and finally to the charge shunt to cause a reading error. All ground leak problems are critical, especially on metal boats and even more on aluminum ones.

The alarm is active

• Check both voltages readings as 1 or 2 batteries voltages are below or over the normal values OR an input fuse is blown (if you did not used included resettable thermistors).

• If you are only using only one battery (or battery bank), combine the DMM-1's White and red leads together to the positive (+) battery terminal.

LIMITED WARRANTY

Microlog Technologies Inc. warrants to the original purchaser, only for 24 months from the date of purchase, that the PANEL or DMM-1 instrument will be in good working order when properly installed and operated as described in this Manual. If your Microlog equipment fails to perform or becomes defective under normal use and service, you must first obtain a Return Merchandise Authorization (RMA) and pay shipping to our facility for repair. Collect or shipment without RMA will not be accepted. We will pay shipping for returning the instrument anywhere in North America if it is under warranty.

AS WE HAVE ABSOLUTELY NO CONTROL ON THE WAY YOU INSTALL YOUR ELECTRICAL EQUIPMENT, ALL WARRANTIES ARE STRICTLY LIMITED TO THE PANEL OR DMM-1 INSTRUMENT FUNCTIONALITY AND NO OTHER EXPRESSED OR IMPLIED WARRANTY IS APPLICABLE. THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANT-ABILITY, EXPRESS OR IMPLIED, AND OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF MICRO MEDIA PLUS FOR DAMAGES, INCLUDING, BUT NOT LIMITED TO LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS OR CONSEQUENTIAL DAMAGES, WHICH MAY ARISE OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE INSTRUMENT.

Some states do not allow the exclusion or limitation of incidental or consequential damages, and some states do not allow limitations on how long an implied warranty lasts, so if the law of that state applies, the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have others, which vary, from state to state.

PANEL SPECIFICATIONS:

- Material: 0.125" 6061-T6 Aluminum Alloy for Deluxe panels
- Panel Finish: Black textured Epoxy paint.
- Voltage Rating: 12 VDC
- Amperage Rating: Bus Bars: 100A,

up to 12, or 20/ 15 Ampere A-Series branch circuit breakers (installed according to American Boat and Yacht Council (ABYC) Standards and Recommended Practices for Small Craft sections: E-1, E-3, E-9).

- Deluxe panels have Identification LEDs on each circuits.
- Overall Dimensions: 12DC-DMM: 7.5" x 9" / 19.0cm x 22.9cm
  20DC-DMM: 10.75" x 9" / 27.3cm x 22.9cm

DMM-1 FEATURES:

- All in one single reliable instrument
- Precise 2 battery banks voltage monitoring
- Separate Charge and Discharge current circuits
- Low battery voltage alarms
- High battery voltage alarms
- Simple, quick and easy monitoring mode selection
- Rugged Polycarbonate facing
- Corrosion treated circuit for marine use
- Surface Mount Technology circuit
- Stainless steel hardware

DMM-1 SPECIFICATIONS:

Voltage measurement range	8.0 -17.0 volts
Resolution (volts)	0.01 volts
Measurement precision	± 0.03 volts (20°C)
Low voltage level alarm point	11.8 volts
High voltage level alarm point	15.1 volts
Current measurement range	0-200 amps.
Resolution (amperes)	0.1 amps.
Measurement precision	±0.2 amps. (20°C)
Operating current requirements	2.0mA (off) 18.0mA (on)
Operating temperature range	0-40°C
Storage temperature range	-30° to + 60°C

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