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Please ensure that you read & understand the following installation instructions before using your Monsoon.

1. IMPORTANT NOTES

- The Monsoon's LED has a fixed level of brightness (i.e. it does *not* auto-dim like our Eclipse model)
- Make sure your connections are well made and secure. Do not attempt to tape or wrap wires together as this is dangerous and will also drop the voltage 'seen' by the monitor. Please use solder, crimp connectors, connector block or another proprietary method.
- Do not connect to a vehicle's alternator – it is *not* a direct replacement for the original charge-indicator.
- Do not connect on the same positive line as your vehicle's horn, as some electro-mechanical horns (especially on older vehicles) may throw out harmful voltage spikes when operated.
- Never 'test' the monitor on a battery charger or any other mains powered adaptor, regardless of whether the output voltage seems safe. It works – connect it to your battery only.
- You can charge the battery while the monitor is connected but always have the monitor connected to the battery – never only to the charger.
- Avoid bending the LED relative to the circuit board as this may affect the waterproofing or result in breakage.
- Avoid placing any strain on the wires and make your installation tidy using cable wraps.
- When removing the LED from bezel always *push the LED out*, never pull it out by the board or leads.
- It is usually okay to connect the monitor directly to the battery, but if the vehicle will be idle for more than a few weeks you should charge the battery as required.

2. MOUNTING THE MONSOON IN YOUR PANEL

Model	LED diameter	Required hole size for bezel	Standard lead length	Depth behind panel
Monsoon10	10.0mm	14.0mm	600mm	24.0mm
Monsoon8	8.0mm	12.0mm	600mm	22.0mm
Monsoon5	4.9mm	8.0mm	600mm	12.0mm

Please ensure you understand the installation process and are confident in your skills before beginning.

Before drilling your panel, we recommend covering the area with masking tape – this will prevent any accidental scratches to your panel, help stop your drill bit from slipping and make it easier to mark where you want your hole to be. If you do not have a sufficiently large drill bit, make the hole as large as you can by drilling then use a round file to open the hole out to necessary size. When you are approaching the correct dimension, frequently stop filing and check the fit. *Remember, you can always take a bit more away from the hole, but you can't put it back again – so please work carefully.* Once your hole is the correct size, simply mate together the LED and bezel then push the bezel into the panel. When fitted correctly, the bezel grips the LED in place.

Note that you can mount the Monsoon without using the bezel, however you will need to make your own arrangements to secure the monitor in place (e.g. using a small amount of silicone, hot glue or other adhesive applied behind the panel). If you opt for this approach and are confident in your DIY skills, you could also remove the front ring from the bezel (remove with a fine saw or snippers then smooth the base with abrasive paper) and use it as a trim. This approach means the required panel hole is 4mm smaller (or 3mm in the case of the Monsoon5). Please ensure you are confident in your skills before attempting this approach.

3. ELECTRICAL CONNECTIONS

Connect the black wire to a good earth or the negative battery terminal, and the red wire to the positive side of your circuit. The monitor is suitable for both negative earth and positive earth vehicles (on a positive earthed vehicle the red wire will go to earth or the positive battery terminal).

The importance of well made, solid, insulated connections cannot be overstated. This is important both for safety and for accuracy. You can either wire the monitor into a switched circuit (so that it will go off when you turn off the ignition) or connect it directly to the battery (you might need to extend the wiring to do this). The monitor will not be adversely affected from being directly connected to the battery (always on), but if the vehicle will be idle for more than a few weeks you should charge the battery as required. Typical current drains are given in the datasheets available from our website.

Note that the voltage at different points in a vehicle's electrical system will vary depending on the load (e.g. the voltage in the headlight circuit will be noticeably lower than the voltage at the battery). Avoid connecting the monitor into any high-load circuit (e.g. headlights, brake light, heated accessories, horn) as the voltage it 'sees' will be lower than the actual battery voltage. If you have a digital voltmeter, it is a good idea to compare the voltage at the point of connection to the voltage at the battery: ideally the difference will be no more than 0.1 or 0.2v.

Make your wiring tidy and secure using cable ties or electrical tape. Ensure that wiring cannot be trapped, chafed or touch anything hot (such as your exhaust system). *Short circuits in wiring are dangerous and can lead to fire.* For this reason it is recommended, if you are connecting directly to your battery, to fit a fuse close to the point of connection (the value should be around 100mA, but up to 0.5A is fine). If you are fitting the monitor to a supply switched by the ignition key it should be protected by the existing fuse box. Any additional wire that you use should be a good quality insulated type at least of the same gauge as fitted to the monitor (with no upper limit on gauge) and you should observe colour codes.

4. USING THE MONITOR

When you power up the monitor, the LED will quickly flash red/amber/green then it will begin monitoring your battery voltage and display accordingly. The module is programmed to prevent the LED moving quickly from one output to another when the voltage is on or near the threshold values. Please note that a very small percentage of users have difficulty discriminating between the red and amber colours – use the start up sequence (red/amber/green) to see the difference. If you do have difficulty telling the two apart, any confusion has been designed out by the fact that amber is always steady (not flashing) and reds are always flashing (i.e. if you see what looks like a steady red, it is in fact amber).

Note that when the battery is under load the voltage will tend to drop as long as the load is applied, and will bounce back when the load is removed (except when the battery is under charge from an alternator, when the voltage should remain fairly constant whether the battery is under load or not).

5. 12V MONSOON – STANDARD VOLTAGE THRESHOLDS, OUTPUTS & INTERPRETATION

Voltage	Output	Engine running	Engine stopped (electrics off)
>15.20v	 green/red alternating	over-charging – regulator problem	not applicable
>13.20v	 green steady	normal charging	exceptional battery charge (uncommon)
>12.45v	 amber steady	under-charging – alternator problem	normal battery, charged and in good health
>12.25v	 red slow flashing	not charging – battery low	fair battery charge
>12.05v	 red 2 flashes, repeating	not charging – battery low	low battery charge
>11.80v	 red 3 flashes, repeating	not charging – battery very low	very low battery charge
<11.80v	 red 4 flashes, repeating	not charging – battery very low	consider renewing battery

If you are uncertain of anything please ask us, or consult a qualified automotive electrician.