GAMMATRONIX PROGRAMMBLE LED BATTERY MONITOR - L

Specification : The unit can be programmed to monitor the voltage level of NiMh/NiCad, Alkaline/Zinc carbon and LiPo batteries. Six different voltage ranges for each battery type (four with LiPo) allows the user to select to suit their application. The voltage of the battery is indicated on the 5mm tri-colour LED. The device makes a 'rolling average' of over the last 2 seconds, which will give a degree of immunity to false indications. Accuracy to 1%. 5mA average current . Unit will operate down to 3.2v and up to 20v without damage regardless of battery voltage programmed. Weight less than 3 grams with 50mm leads. Unit is delivered programmed to Alkaline, 9v range. Programmed settings are retained without battery power for 100 years. *NOTE : If using with 3.7v LiPo, the Red Fast level is NOT available as it is below the minimum 3.2v operating point. In this case, consider any Red LED indication as a fully discharged battery.*

Indications : The unit will indicate, over 9 displayed levels, the voltage of the battery pack. The 8 equal steps between 9 levels are shown as per the colour chart below. The LED indicates maximum manufacturer's range of the cell, however your actual application or device may not be able to work over the full cell voltage range and may stop working before the 'base' level of the battery (red fast flash). To determine actual voltage displayed and your application limit, divide the indicated range by EIGHT. So, for example, a 9v Alkaline has a range of 6 to 9v, (6v = fully discharged, 9v = fresh cell) with 0.375v steps per level. If the minimum 'OK' battery level in your specific application is 7.5v, then the 'lowest' colour to indicate battery OK would be slow yellow flashing. (Base cell volts 6v, then 4x 0.375 steps = 1.5v, 6v + 1.5v = 7.5v).

FULL (Max)								DISCHARGED (Min)
Green(9)	Slow Grn(8)	Green Fast(7)	Yellow (6)	Slow Yell(5)	Fast Yell (4)	Red (3)	Red Slow (2)	RedFast (1)

		1	2	3	4	5	6
1	NiMh / NiCad	4.8v cell	6.0vcell	7.2v cell	8.4v cell	9.6v cell	12v cell
	Min/Max Range	4-4.8v	5-6v	6-7.2v	7-8.4v	8-9.6v	10-12v
2	Alkaline / Zinc Carbon	4.5v cell	6.0vcell	7.5v cell	9.0v cell	10.5v cell	12v cell
	Min/Max Range	3-4.5v	4-6v	5-7.5v	6-9v	7-10.5v	8-12v
3	LiPo Types	3.7v cell	7.4v cell	11.1v cell	14.8v cell	Same as (4)	Same as (4)
	Min/Max Range	3.0-3.7v	6.0-7.4v	9.0-11.1v	12.0-14.8v	Same as (4)	Same as (4)

Battery types and voltage ranges for each are pre-set in the device for ease of installation. The user may select any battery type/voltage range which may better suit their application other than the default ranges suggested. (Within the capabilities of the cells in use).

Fitting : The device is supplied as a skeleton PCB assembly with a LED mounting clip. If the mounting clip is used, it requires a 6.5mm panel hole. You may wish to devise your own mounting method without the clip, in this case a 5mm hole is required. The unit is supplied with the LED in line with the PCB. The user may bend this through 90 degrees in either direction ONCE ONLY if required to achieve a different mounting aspect. If the unit is mounted with LED at 90 degrees, or the adhesive pad is used, **avoid causing shorts to metal or other conductive surfaces**.

Connect the RED wire to supply positive, and the BLACK wire to supply negative. OBSERVE POLARITY OR UNIT MAY BE DAMAGED. The most accurate reading is obtained if connected directly to the battery and not through existing wiring which may be carrying heavy currents that may cause voltage drops at the LED. The unit should have the wiring to it protected by an additional suitable local fuse at a point close to the battery, rated 2A or less. Your installation may already have such a fuse fitted. If the unit is to be used outside and/or may get wet, seal the bezel into its mounting hole, and the LED into the bezel itself, with a small amount of clear silicon or similar, and prevent water contact with the PCB.

Programming : The unit should be programmed <u>prior to final fitment into the mounting hole</u> if it is difficult to reach the programming button after this time. The unit can be operated within the pre-defined battery types, and voltage combinations (16 in total).

The <u>Battery type</u> is set via the programming button in 'green' programming mode. Battery types 1-3 can be identified in the green column of the voltage table above. <u>Battery Voltage</u> is selected in 'red' programming mode, from the 6 ranges shown in the red heading same table. Therefore to select "Alkaline 9v battery", we program "2" in Green programming mode, and "4" in Red programming mode.

To select a different battery type setting (Hold button till flashing green) :

- Apply power to the unit, and wait 2-3 seconds for the unit to start up.

- Press AND HOLD the button. The LED will go out. After approx 4 seconds, the LED will rapidly flash GREEN.

- Release the button. This will cause the unit to move to the next battery type, which from the delivered state, will cause the unit to go from 2 (Alk) to 3 (LiPo). (Next subsequent setting step wraps around back to type 1).

- The unit will confirm its current map setting by flashing back a colour shown in the table below.

- Repeat the process above (if required) to cycle through the battery types one at a time until you reach your choice.

The battery voltage range (4.8, 6v, 7.2v etc) can be selected in a similar way to the battery type, (Hold button till flashing RED)

- Apply power to the unit, and wait 2-3 seconds for the unit to start up.

- Press AND HOLD the button. The LED will go out. After flashing green, in approx 8 seconds, the LED will rapidly flash RED.

- Release the button. This will cause the unit to set to the next battery voltage (for the battery type selected), which from the delivered state, will cause the unit to go from 9v to 10.5v Alkaline range. Subsequent settings will step through the voltage types to the highest, then wrap back around to the lowest voltage setting.

- The unit will confirm its battery voltage setting by flashing back a colour shown in the table below.

- Repeat the process to cycle through the battery voltages until you reach the one of your choice.

<u>**Confirmation:**</u> Once programmed, the unit will flash back a confirmation sequence to indicate current settings. It will also do so for the next three times power is applied. This allows you to confirm correct setup. At power on, the unit will go blank for 2 seconds, flash a colour sequence to indicate battery volts setting, go blank for 2 seconds, then flash a colour sequence to indicate battery type setting.

Volts Range	Cell Type	RED	GREEN	YELLOW	RED/GREEN	YELLOW/GREEN	YELLOWRED
1	NiMh	X					
2	Alk		X				
3	Lead			X			
4					X		
5						X	
6							X

Example: LED flashing red/green (Battery voltage) , pausing for 2 seconds, then flashing green (Battery type), = Alkaline, 9v.

NOTE : Batteries exhibit different off-load voltages when idle, or discharged (or 'flat') than when under load. A flat battery off-load may read high, but will immediately collapse to a few volts if current is drawn. As with any other voltmeter, the LED may give an erroneous high reading if the battery is not connected to a load due to your battery's internal resistance off-load effects. Some cells may also have a non-linear discharge curve under high load which may make the indicated voltage level steps unequal in terms of remaining capacity indication. Always read and understand your batteries specification and user instructions. The unit has inbuilt interference suppression, but in very noisy electrical environments it may require additional in-line suppression which can be purchased from car radio installation stores.

<u>Safety, end of life, and warranty statement</u>

This unit is an installable component and not a complete system in its own right and therefore requires installation. The installation, use and suitability in a given application is the responsibility of the installer. Any damages or consequences are limited to the replacement of the unit under the 12 month guarantee. Do not allow the unit to become damaged, wet, dismantled, or make modifications to the device. Do not use the unit outside of its operating voltage specification. At end of life, product should be taken to suitable recycling facilities.