

Hints and tips - Quick selection of LED resistors.

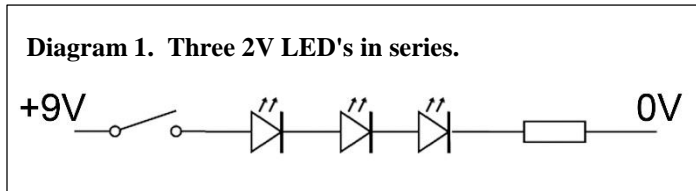
Finding the resistor value.

When planning to put LED's into a model, there are 3 things you can choose independently, and a fourth which you have to select based on the other three. The three items you can choose are battery voltage, LED colour, and LED quantity. These three determine the fourth: what rating of resistor you will need. A resistor is essential to limit the current flow.

Table 1 below is a quick way of selecting such a resistor, where the LED's are connected in series.

An example will show how the table can be used. Let's assume we want to fit 3 LED's supplied from a 9V battery. Diagram 1 below shows 3 LED's connected in series with a switch and a resistor, and supplied from a 9V battery.

If we want to use yellow LED's we go to the column headed 9V and read down until we come to the line for a



quantity of 3. The value there is 150 ohms.

If we decide we would prefer to use white LED's, we read down to the line for 3 white LED's and see that there is no value. This indicates that this arrangement is not possible. To use 3 white LED's we have to split the LED's between two separate runs, one with 2 LED's and a 100 ohm resistor, and another with 1 LED and a 270 ohm resistor.

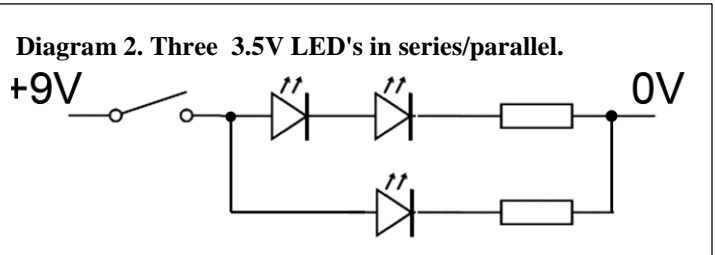
It is possible to mix blue or white LED's in series with the other colours, but that combination requires separate calculation of resistor rating.

Resistor marking.

The resistance value of resistors is shown by 3

Table 1. Resistor rating in ohms (1/4 watt)

LED type	Qty	Voltage							
		4.8	6	7.2	8.4	9	9.6	10.8	12
Red, Green, Yellow, Orange (or any LED with 2V drop.)	1	150	220	270	330	390	390	470	560
	2		100	180	220	270	330	390	470
	3			68	120	150	180	270	330
	4				22	56	82	150	220
	5							47	100
Blue, White (or any LED with 3.5V drop)	1	68	120	220	270	270	330	390	470
	2			10	82	100	150	220	270
	3							15	82



coloured stripes painted on them. The 4th stripe is the tolerance on the value, and is usually gold (5%) or silver colour (10%).

Hold the resistor with the gold or silver stripe on the right hand end, and read the other colours from left to right. The values are shown in Table 2. Find the combination of colours that matches the stripes on your resistor in a column; the value is shown in the third column. So if a resistor has stripes of brown-green-brown, the 3rd column, 4th line of Table 2 shows that brown-green means a value of '15'. The third stripe of brown means a multiplier of x 10, as stated in the note at the top. So the resistor value is 15 x 10 = 150 ohms.

LED marking

The triangular symbol in the diagrams is the standard electrical symbol for an LED – it's like an arrow showing the direction of current flow.

The negative side of an LED always has the shortest wire, and a flat spot on the side of the lens.

Table 2. 3rd stripe is the multiplier: Black is x1; Brown is x10. 4th stripe is tolerance and can be ignored.

1st digit 1st stripe	2nd digit 2nd stripe	Value
Brown	Black	10
Brown	Red	12
Brown	Green	15
Brown	Grey	18
Red	Red	22
Red	Violet	27
Orange	Orange	33
Orange	White	39
Yellow	Violet	47
Green	Blue	56
Blue	Grey	68
Grey	Red	82