

Craig's Guide to Resistors

See page 807 of the 2011/12 Catalogue

Resistors 'resist' or 'impede' the flow of electrons through part of a circuit to which they are part of. They don't have a polarity so can be inserted either way round, unlike diodes.

They are fundamental parts of many electronic circuits, but can be used for example, to limit the current through an LED to prevent it burning out, or simply to reduce a signal level.

The SI* unit of resistance is the ohm, denoted by the Greek symbol Ω (uppercase Greek Omega). This symbol is often omitted in circuit diagrams as the value is displayed adjacent to a resistor.

**see the appendix for an explanation of 'SI'*

Limitations in some systems, including our till system, mean that some special symbols aren't available, so the symbol ' Ω ' is replaced with 'R'.

For example a resistor with a value of 560Ω could be written as such, or instead as 560R.

A resistor with a value of $470\,000\Omega$ could be written as $470k\Omega$, or simply and more commonly as 470k.

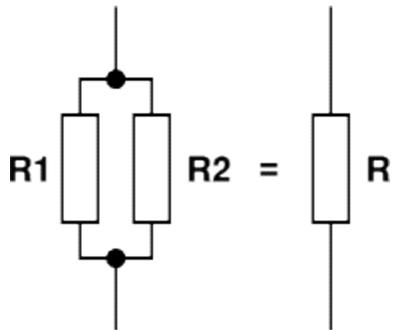
Now a resistor with a value of 4700Ω or $4.7k\Omega$ is commonly written as 4k7 — the SI multiplier (kilo, mega etc.) also performing the role of the decimal point. For low values such as 1.2Ω this would be written 1R2.

The Maplin 0.6 Watt metal film resistors are the most commonly requested, and the customer will often know what value they require. The values of these resistors that we stock range from 1Ω to $10M\Omega$.

The stock code is made up from the device's value, preceded by the letter 'M' in the case of the 0.6W resistors, or 'D' in the case of 2W resistors. As shown above we don't use a decimal point, so the 1.2Ω 0.6W resistor would therefore be M1R2, and the $4.7k\Omega$ one will be M4K7.



ALWAYS ask the customer what they intend to use the resistor for, as their application might require a resistor with a higher-wattage to dissipate more heat. The higher-wattage resistors don't have as wide a range of values as the standard 0.6W metal film ones, but all is not lost!



A resistor network can be created:

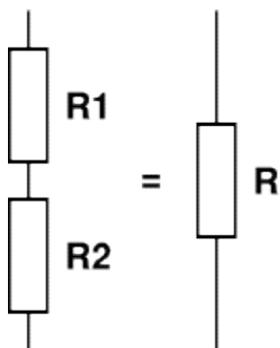
If a 1W resistor at 1kΩ is required, then by placing two 0.6W 2kΩ resistors in parallel the wattage is doubled to 1.2W because they share the load, however the total value of resistance is 1kΩ

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$

With the numbers inserted into the equation this becomes;

$$\frac{1}{2} + \frac{1}{2} = \frac{1}{1}$$

What is happening in the case above, is that an extra pathway is provided for the electrons to flow, therefore making their journey easier. This is equivalent to there being *less resistance*. An analogy: A narrow doorway will impede or resist the flow of people in comparison to say, a large double-door. But if we add a second narrow doorway in addition to the first, then twice the flow of people can pass through. In this sense, the second resistor in parallel (as shown above) acts as a second 'doorway'.



Likewise, two resistors of half the required value each can be placed in series. They will again share the load, and each will dissipate half of the heat.

In this case the analogy would be like having two double-doorways, one after the other, such that the flow of people is restricted as if there were one smaller doorway.

For resistors in series, the values are simply added up.

NOTE: For the 'wattage equivalency trick' shown above; unless you wish to work through the equations, or use the handy calculator on Maplin.net, it's best to use two resistors of the same value.

SALES

Does the customer require a soldering iron?

The Antex irons are excellent quality (Craig's personal recommendation!) and the 18W variant [FY62] is a great all-rounder for small electronic jobs.

The soldering iron stand FR20 is very sturdy and comes with a sponge for cleaning the tip too.

(Tip packs N14FR & N15FR fit the above-mentioned iron)

What about solder?

A de-soldering pump to help remove the faulty component? [N40CH]

If the customer has never soldered before, we sell a small book called 'The Art of Soldering' [CJ23] for just £3.99

APPENDIX

SI - (abbreviated **SI** from French: *Système international d'unités*)

Bibliography

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