Resistors in Series and Parallel

Total resistance of up to six resistors connected in series and in parallel, with the current share of each branch; the same sums apply to inductors.

Method: Kirchhoff's laws (series and parallel combination of resistances)

Input parameters

Unit system: SI

Parameter	Value	Unit
Resistor 1 (0 = not used)	100.00	Ω
Resistor 2 (0 = not used)	220.00	Ω
Resistor 3 (0 = not used)	470.00	Ω
Resistor 4 (0 = not used)	0	Ω
Resistor 5 (0 = not used)	0	Ω
Resistor 6 (0 = not used)	0	Ω

Calculated results

Parameter	Value	Unit
Total resistance, all in series	790.00	Ω
Total resistance, all in parallel	59.977	Ω
Resistors counted	3.0000	
Share of the total current in R_1 (parallel)	59.977	%

Notes for this case

- Capacitors combine the other way round: in parallel they add, in series their reciprocals add.

Formula and method

$$R_s = \sum R_k$$

$$\frac{1}{R_p} = \sum \frac{1}{R_k}$$

$$\frac{I_1}{I} = \frac{R_p}{R_1}$$

Variables

R_1	Resistor 1 (0 = not used)	Ω
R_2	Resistor 2 (0 = not used)	Ω
R_3	Resistor 3 (0 = not used)	Ω
R_4	Resistor 4 (0 = not used)	Ω
R_5	Resistor 5 (0 = not used)	Ω
R_6	Resistor 6 (0 = not used)	Ω
R_s	Total resistance, all in series	Ω
R_p	Total resistance, all in parallel	Ω
n	Resistors counted	-
I_1/I	Share of the total current in R_1 (parallel)	-

Method and standards

From Kirchhoff's laws: resistances in series carry one current and add; in parallel they share one voltage and their conductances add.

Assumptions and limits

- Pure resistances (or inductors without mutual coupling).
- Up to six branches.

References

- Kirchhoff's laws (series and parallel combination of resistances)

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/circuits/resistors-series-parallel

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.