

Universal Wire Sizing Chart

This chart works for any voltage or voltage drop, American (AWG) or metric (mm²) sizing. It applies to typical DC circuits and to some simple AC circuits (*single-phase AC with resistive loads, not motor loads, power factor = 1.0, line reactance negligible*).

STEP 1: Calculate voltage drop index (VDI) using the following formula

$$\text{VDI} = \frac{\text{AMPS} \times \text{FEET}}{\% \text{ VOLT DROP} \times \text{VOLTAGE}}$$

VDI = Voltage Drop Index
(reference number based on resistance of wire)
FEET = ONE-WAY wiring distance
(1 meter = 3.28 ft)
% VOLT DROP = Your choice of acceptable voltage drop
(example: use 3 for 3%)

STEP 2: Use VDI to determine the appropriate wire size

Compare **your** calculated VDI with VDI in the chart to determine the closest wire size. Amps must not exceed the AMPACITY indicated for the wire size.

Copper		Aluminum		Wire Size	Area
VDI	AMPACITY	VDI	AMPACITY	AWG	mm ²
1	10	NOT RECOMMENDED		16	1.31
2	15			14	2.08
3	20			12	3.31
5	30			10	5.26
8	55			8	8.37
12	75			6	13.3
20	95			4	21.1
31	130	20	100	2	33.6
49	170	31	135	0	53.5
62	195	39	150	00	67.4
78	225	49	175	000	85
99	260	62	205	0000	107

Metric Size

by cross-sectional area

Available sizes: 1 1.5 2.5 4 6 10 16 25 35 50 70 95 120 mm²

Copper	Aluminum
VDI x 1.1 = mm ²	VDI x 1.7 = mm ²

Example: 20 Amp load at 24V over a distance of 100 ft with 3% max voltage drop

$$\text{VDI} = \frac{20 \times 100}{3 \times 24}$$

VDI = 27.78

For copper wire, the nearest **VDI = 31**
This indicates #2 AWG wire or 35mm²

NOTES: AWG = American Wire Gauge. Ampacity is based on the National Electrical Code (USA) for 30°C (86°F) ambient air temperature, for no more than three insulated conductors in raceway or in free air, using cable types AC, NM, NMC and SE and/or conductor insulation types TA, TBS, SA, AVB, SIS, RHH, THHN and XHHW. PV array wiring must tolerate higher temperatures, so minimum wire size to meet ampacity may be larger than shown. For other conditions, refer to the National Electric Code or an engineering handbook.