



Quick Overview

As electric current flows through wire, there is a loss in voltage. This loss is referred to as IR voltage drop.

Voltage (Drop) = Wire Resistance X Amps of current (E=IR)

Calculating the voltage loss for a pair of wires gets a little complicated, so we have constructed a quick look up table for what size wire you will need for your application. The table below is for 12-volt ac or dc devices only. You just need to know the power in Watts (VA), or Amps and the table will show how far you can go in feet for any size wire pair listed. The table is based on a 10% loss of voltage on a pair of wires. This should work for most 12-volt devices. Checking the manufacturer's specifications, use the maximum watts or current and be sure the minimum operational voltage is 10v or below. The footage in the table is linear, a 20% loss would double the distance, or 5% would cut it in half.

The table calculations are based on the ohms of the wire at 70°F. If the wire temperature is raised to 130°F the voltage drop would increase by about 3%. The voltage drop calculations are also based on a conventional load. If manufacturer makes recommendations for wire sizes, use them instead of this table.

Wire Length Table

12V Power Required W(VA)/Amps	The recommended maximum distances for 12volts, ac or dc, is the cell below the wire size, adjacent to watts (VA) or required current.									
	WIRE GAUGE									
	8awg	10awg	12awg	14awg	16awg	18awg	20awg	22awg	24awg	26awg
3W/.25A	3,733	2,396	1,508	947	595	376	234	146	93	59
4W/.33A	2,828	1,815	1,142	717	451	285	177	111	70	44
5W/.42A	2,222	1,426	898	564	354	224	139	87	55	35
10W/.83A	1,124	722	454	285	179	113	71	44	28	18
20W/1.67A	559	359	226	142	89	56	35	22	14	9
30W/2.50A	373	240	151	95	60	38	23	15	N/A	N/A
40W/3.33A	280	180	113	71	45	28	18	11	N/A	N/A
50W/4.17A	224	144	90	57	36	23	14	N/A	N/A	N/A
60W/5.00A	187	120	75	47	30	19	12	N/A	N/A	N/A
70W/5.83A	160	103	65	41	26	16	10	N/A	N/A	N/A
80W/6.67A	140	90	57	35	22	14	N/A	N/A	N/A	N/A
90W/7.50A	124	80	50	32	20	13	N/A	N/A	N/A	N/A
100W/8.33A	112	72	45	28	18	11	N/A	N/A	N/A	N/A
110W/9.17A	102	65	41	26	16	10	N/A	N/A	N/A	N/A
120W/10.00A	93	60	38	24	15	N/A	N/A	N/A	N/A	N/A

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Voltage (Drop) = Wire Resistance X Amps of current (E=IR)

Calculating the voltage loss for a pair of wires gets a little complicated, so we have constructed a quick look up table for what size wire you will need for your application. The table below is for 24-volt ac or dc devices only. You just need to know the power in Watts (VA), or Amps and the table will show how far you can go in feet for any size wire pair listed. The table is based on a 10% loss of voltage on a pair of wires. This should work for most 24-volt devices. Checking the manufacturer's specifications, use the maximum watts or current and be sure the minimum operational voltage is 21.6v or below. The footage in the table is linear, a 20% loss would double the distance, or 5% would cut it in half.

The table calculations are based on the ohms of the wire at 70°F. If the wire temperature is raised to 130°F the voltage drop would increase by about 3%. The voltage drop calculations are also based on a conventional load. If manufacturer makes recommendations for wire sizes, use them instead of this table.

Wire Length Table

24V Power Required W(VA)/Amps	The recommended maximum distances for 24volts, ac or dc, is the cell below the wire size, adjacent to watts (VA) or required current.									
	WIRE GAUGE									
	8awg	10awg	12awg	14awg	16awg	18awg	20awg	22awg	24awg	26awg
3W/.13A	14,417	9,253	5,823	3,656	2,299	1,451	905	565	358	226
4W/.17A	11,025	7,076	4,453	2,796	1,758	1,110	692	432	274	173
5W/.21A	8,925	5,728	3,605	2,263	1,423	898	560	350	222	140
10W/.42A	4,463	2,864	1,803	1,132	712	449	280	175	111	70
20W/.83A	2,258	1,449	912	573	360	227	142	89	56	35
30W/1.25A	1,499	962	606	380	239	151	94	59	37	24
40W/1.67A	1,122	720	453	285	179	113	70	44	28	18
50W/2.08A	901	578	364	229	144	91	57	35	22	14
60W/2.50A	750	481	303	190	120	75	47	29	19	12
70W/2.92A	642	412	259	163	102	65	40	25	16	10
80W/3.33A	563	361	227	143	90	57	35	22	14	9
90W/3.75A	500	321	202	127	80	50	31	20	12	8
100W/4.17A	449	288	182	114	72	45	28	18	11	7
110W/4.58A	409	263	165	104	65	41	26	16	10	6
120W/5.00A	375	241	151	95	60	38	24	15	9	6
130W/5.42A	346	222	140	88	55	35	22	14	9	5
140W/5.83	321	206	130	82	51	32	20	13	8	5
150W/6.25 A	300	192	121	76	48	30	19	12	7	5
160W/6.67A	281	180	114	71	45	28	18	11	7	4
170W/7.08A	265	170	107	67	42	27	17	10	7	4
180W/7.50A	250	160	101	63	40	25	16	10	6	4
190W/7.92 A	237	152	96	60	38	24	15	9	6	4
200W/8.33 A	225	144	91	57	36	23	14	9	6	4

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