Conductors Sized (AWG) for 3% Voltage Drop

Use 3% voltage drop for any "critical application" affecting the safety of the vessel or its passengers: bilge pumps, navigation lights, electronics, etc....

Length (feet): Determined by measuring the length of the conductor from the positive (+) power source connection to the electrical device and back to the negative (-) power source connection. Note that the power source connection may be either the battery, panelboard or switchboard.

Current (amps): Determined by adding the total amps on a circuit.

Conductor sizes not covered in the following tables may be calculated by using the following formula:

$$CM = \frac{K \times I \times L}{E}$$

After calculating the Circular Mil Area (CM), use the temperature rating chart to determine the proper conductor size (National Fire Protection Agency and Coast Guard require that the next larger conductor be used when the calculated CM area falls between the two conductor sizes).

CM = Circular Mil Area of Conductors

K = 10.75 (Constant representing the mil-foot resistance of copper)

I = Current - amps

L = Length - feet

E = Voltage drop at load (drop x working voltage)

3% Voltage Drop at 12 Volts

Length		Current (Amps) 5	10	15	20	25	30	40	50	60	70	80	90	100
10'	3 m	18	14	12	10	10	8	6	6	6	6	6	4	4
15'	5 m	16	12	10	10	8	8	6	6	4	4	4	2	2
20'	6 m	14	10	10	8	6	6	6	4	4	2	2	2	2
25'	8 m	12	10	8	6	6	6	4	4	2	2	2	1	1
30'	9 m	12	10	8	6	4	4	4	2	2	2	2	1	1
40'	12 m	10	8	6	6	4	4	2	2	1	1/0	1/0	2/0	2/0
50'	15 m	10	6	6	4	4	2	2	1	1/0	2/0	3/0	4/0	4/0
60'	18 m	10	6	6	4	2	2	1	1/0	2/0	3/0	3/0	4/0	4/0
70'	21 m	8	6	4	2	2	1	1/0	2/0	3/0	3/0	4/0	4/0	
80'	24 m	8	6	4	2	2	1	1/0	2/0	3/0	4/0	4/0		
90'	27 m	8	4	2	2	1	1/0	2/0	3/0	4/0	4/0			
100'	30 m	6	4	2	2	1	1/0	2/0	3/0	4/0				
110'	33 m	6	4	2	2	1	1/0	2/0	3/0	4/0				
120'	36 m	6	4	2	1	1/0	2/0	3/0	4/0					
130'	40 m	6	2	2	1	1/0	2/0	3/0	4/0					
140'	43 m	6	2	2	1/0	2/0	3/0	4/0						
150'	46 m	6	2	1	1/0	2/0	3/0	4/0						
160'	49 m	6	2	1	1/0	2/0	3/0	4/0						
170'	52 m	6	2	1	2/0	3/0	3/0	4/0						

3% Voltage Drop at 24 Volts

Length		Current (Amps) 5	10	15	20	25	30	40	50	60	70	80	90	100
10'	3 m	18	18	16	14	12	12	10	10	10	8	8	8	6
15'	5 m	18	16	14	12	12	10	10	8	8	6	6	6	6
20'	6 m	18	14	12	10	10	10	8	6	6	6	6	4	4
25'	8 m	16	12	12	10	10	8	6	6	6	4	4	4	4
30'	9 m	16	12	10	10	8	8	6	6	4	4	4	2	2
40'	12 m	14	10	10	8	6	6	6	4	4	2	2	2	2
50'	15 m	12	10	8	6	6	6	4	4	2	2	2	1	1
60'	18 m	12	10	8	6	6	4	4	2	2	1	1	1/0	1/0
70'	21 m	12	8	6	6	4	4	2	2	1	1	1/0	1/0	2/0
80'	24 m	10	8	6	6	4	4	2	2	1	1/0	1/0	2/0	2/0
90'	27 m	10	8	6	4	4	2	2	1	1/0	1/0	2/0	2/0	3/0
100'	30 m	10	6	6	4	4	2	2	1	1/0	2/0	2/0	3/0	3/0
110'	33 m	10	6	6	4	2	2	1	1/0	1/0	2/0	3/0	3/0	4/0
120'	36 m	10	6	4	4	2	2	1	1/0	2/0	3/0	3/0	4/0	4/0
130'	40 m	8	6	4	2	2	2	1	1/0	2/0	3/0	3/0	4/0	4/0
140'	43 m	8	6	4	2	2	1	1/0	2/0	3/0	3/0	4/0	4/0	
150'	46 m	8	6	4	2	2	1	1/0	2/0	3/0	3/0	4/0	4/0	
160'	49 m	8	6	4	2	2	1	1/0	2/0	3/0	4/0	4/0	4/0	
170'	52 m	8	6	2	2	1	1	2/0	3/0	3/0	4/0	4/0		

3% Voltage Drop at 32 Volts

Length		Current (Amps) 5	10	15	20	25	30	40	50	60	70	80	90	100
10'	3 m	18	18	16	16	14	14	12	12	10	10	10	8	8
15'	5 m	18	16	14	14	12	12	10	10	8	8	8	6	6
20'	6 m	18	16	12	12	12	10	10	8	8	6	6	6	6
25'	8 m	18	14	12	12	10	10	8	8	6	6	6	6	4
30'	9 m	16	14	10	10	10	8	8	6	6	6	4	4	4
40'	12 m	16	12	10	10	8	8	6	6	4	4	4	2	2
50'	15 m	14	12	8	8	8	6	6	4	4	2	2	2	2
60'	18 m	14	10	8	8	6	6	4	4	2	2	2	2	1
70'	21 m	12	10	6	6	6	6	4	2	2	2	1	1	0
80'	24 m	12	10	6	6	6	4	4	2	2	1	1	0	0
90'	27 m	12	8	6	6	6	4	2	2	2	1	1/0	1/0	2/0
100'	30 m	12	8	6	6	4	4	2	2	1	1/0	1/0	2/0	2/0
110'	33 m	10	8	6	6	4	4	2	2	1	1/0	1/0	2/0	2/0
120'	36 m	10	8	6	4	4	2	2	1	1/0	1/0	2/0	2/0	3/0
130'	40 m	10	8	6	4	4	2	2	1	1/0	2/0	2/0	3/0	3/0
140'	43 m	10	6	6	4	2	2	1	1/0	1/0	2/0	3/0	3/0	3/0
150'	46 m	10	6	6	4	2	1	1	1/0	2/0	2/0	3/0	3/0	4/0
160'	49 m	10	6	4	4	2	1	1	1/0	2/0	3/0	3/0	4/0	4/0
170'	52 m	8	6	4	2	2	1	1	1/0	2/0	3/0	3/0	4/0	4/0

TECH TIP

ABYC Recommends...

"Conductors used for panelboard or switchboard main feeders, bilge blowers, electronic equipment, navigation lights, and other circuits where voltage drop must be kept to a minimum, shall be sized for a voltage drop not to exceed three percent. " *ABYC 11.16.1.2.7.*