

# Sizing Wires and Fuses

GsR SGKC Required Sizing Specifications V0.0



This document is the official reference for sizing all wires and safety fuses in the GsR Solar Go-Kart Challenge.

## Calculating the maximum circuit amperage

Locate or calculate the CURRENT IN AMPS of the components in your circuit. Most electrical products include a rating label, or you can find the amperage rating in the documentation that came with the product.

- For circuits with a single component the maximum will be the label rating
- For circuits with multiple components (like the brake circuit which has 2 lights) the maximum circuit amperage will be the sum of the components.

## Wire sizing

Choosing the right wire size for your DC electrical circuit is important. A wire that is too small can overheat and melt. This can happen because all conductors (wires) have some amount of resistance to the electricity that flows through it which causes them to warm up when in use. This heating is permissible if the wires are large enough to dissipate the heat faster than it is generated in the circuit.

For total circuit lengths less than 30 feet long, use the following table to select the minimum sized wire acceptable for the circuit.

Gauge (AWG)	Maximum Amps
18	3
16	5
14	10
12	15
10	30
8	40
1	200

SGKC circuits should not be longer than 30 feet.

## Choosing a Fuse

Fuses act as a failsafe for a circuit. In the event a faulty circuit, the cheap and disposable fuse will blow instead of the components and wires in the circuit. If a fuse that is smaller than the minimum rating is used, the fuse will likely blow frequently as it cannot handle the circuit current. If the fuse is too large, in the event of a short or a failed component, the fuse would never blow and could damage the electrical component or melt a wire. Therefore there is an acceptable range for sizing a fuse. Follow the following steps to choose the appropriate size fuse.

**Step 1:** Establish the maximum circuit amperage (this should be the same amperage used for establishing the minimum wire size).

**Step 2:** Calculate the appropriate fuse amperage minimum and maximum range. The fuse should be sized to be 125-175% larger than the maximum circuit amperage.

**EXAMPLE:** For a 11 Amp circuit. **Minimum Fuse size**  $1.25 \times 11 \text{ Amps} = 13.75 \text{ Amps}$   
**Maximum Fuse size**  $1.75 \times 11 \text{ Amps} = 19.25 \text{ Amps}$

**Step 3:** Choose a common fuse that will protect the circuit from being damaged if there was a short or component malfunction.

**EXAMPLE:** For the 13.75-19.25 Amp range, a 15 Amp fuse will be the appropriate size.