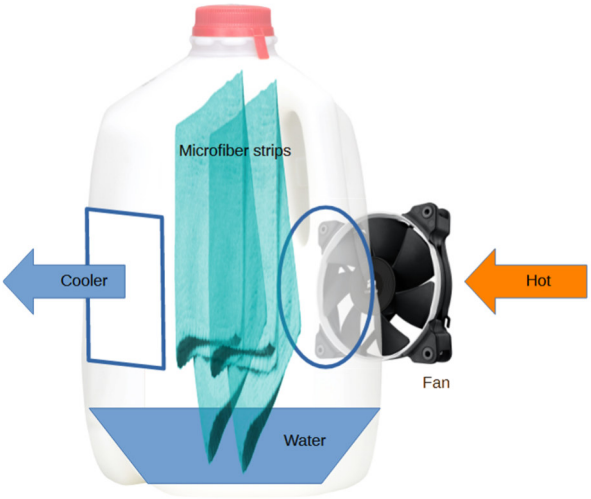
# Desert Cooler Construction Manual

This manual shows you how to build a “desert cooler”, which is a small air conditioner that works only by evaporation of water. The drier the ambient air, the better the cooler works! Therefore, we call it a “*desert* cooler”.




Schematic diagram of how the cooler works.

## Materials

You will need the following materials for construction:

- Used plastic container of a few litres content, ideally about 18cm x 10cm x 25cm (a gallon of juice or soap, etc.)
- Microfibre cleaning cloth
- Desktop computer fan (minimum size 8cm x 8cm).
- 3m of two-colour ‘duplex’ electrical cable (e.g. “audio” cable)
- One of the following:
  - a 24-cell / (about) 500mA solar panel
  - *and* an “in-line” electrical switch
  - *or* a 12V “cigarette lighter” connector
- 50cm of wire
- Electrical connectors (screw terminals)
- Plastic cable ties
- Electrician's tape or heat-shrink tubing

## Tools

You will need the following tools for construction:

- Scissors
- Cutter
- Marker
- Pliers with wire cutters
- Awl or thick nail
- Either needle and thread Or office stapler

- Soldering iron1
- Soldering tin

## Step-by-step construction instructions

### Step 1: Cutting “windows” into the plastic container

First, we cut two “windows” into the plastic container, one on each broadside. On one side, the fan will be fixed. We copy the circle of the fan frame with a marker and cut it out with the cutter. On the opposite side, we cut a rectangular window of about 12cm x 12cm; this is the window through which the cool air will come out.

*Be careful when marking the “windows”*: The lower edge of each window should be at least 5 cm above the bottom of the container. The volume below is needed as a water reserve for the operation of the cooler.

### Step 2: Preparing and installing the microfibre strips

From the cleaning cloth we cut three rectangles (strips) about 25cm long and the width of our container. We fold 2cm on the short side of each strip and fix it in this position, sewing it with thread and needle or with staples from an office stapler (so that the wire can pass through the edge we are creating).

Mark the position of the three wires that pass through the container and that will hold the strips in place. Prepare 6 holes (see photo below) by piercing the plastic with the awl or a thick nail. Cut three pieces of wire , each one 4cm longer than the width of the container



The picture shows the wires and the microfibre strips.

### Step 3: Preparing and installing the fan

The fan usually comes with a very short cable. We add a cable as an extension and attach to the free end of the cable - depending on how the fan is powered - either a solar panel or a plug:

- If the device is powered directly from a solar panel, we connect our extension cable to the positive and negative contacts or wires of the panel. Small panels are sometimes sold

[1] Soldering iron and soldering tin are mandatory if the solar panel has only soldered joints but no wires. Otherwise, both are optional; all connections can also be made with electrical connectors (screw terminals, etc.).

without wires. In this case, we have to solder the wires to the panel with a soldering iron and soldering tin. To be able to turn off the fan, we install an 'in-line' switch on our extension.

- If the fan is powered by a separate 12V solar system (e.g. from a solar house or a "12V solar suitcase"), we connect our extension with a "car cigarette lighter" connector.

All wire-to-wire connections can be made with screw terminals or soldered with a soldering iron and soldering tin. If soldered, the connections must be insulated with tape or heat-shrink tubing.

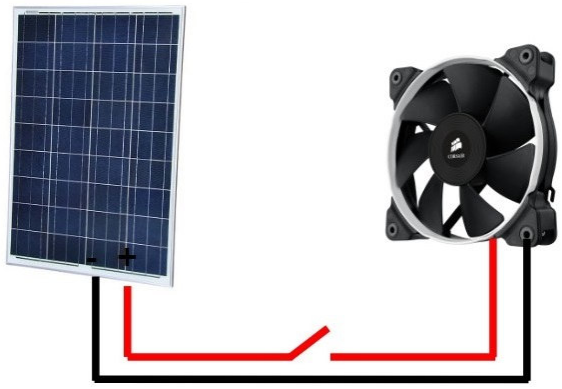


Diagram of the connections in the case of direct use with a solar panel.

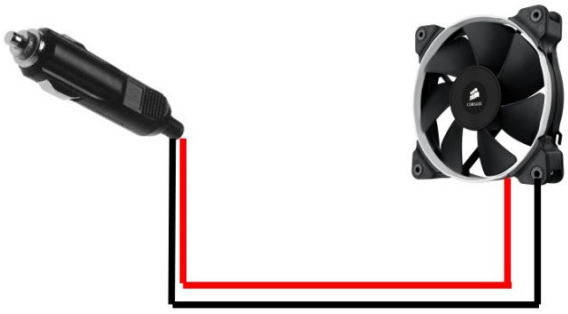


Diagram of the connections in the case of being connected to a solar system with battery.

Now we fix the fan to the plastic container. We can use pieces of wire or cable ties by passing them through the holes in the corners of the fan and through the wall of the container (preparing holes with an awl or a thick nail). Caution: the fan should blow the air from the outside into the container.

The fan is in place and working!

The cooler seen from the other side, where the fresh cool air comes out.

## Tips

Don't forget to fill the bottom of the container with water before using the cooler. After a short time, the microfibre strips get wet and the cooler is ready for use.

The cooler is much weaker than an air conditioner or a large room fan. It is recommended to place the appliance quite close to the person who wants to enjoy a little coolness (less than one metre away). It is not suitable for cooling down a whole room.

Note: The drier the ambient air, the better the cooler works! In the humid tropics, it will have little effect, but in a desert area, it can alleviate the heat.

## Maintenance

Over time, the microfibre can become clogged with limescale or algae. We leave the strips in chlorinated water for a few minutes and afterwards rinse them well with water, so that they can be used again.