

D Star BASIC STIRLING ENGINE



The Basic Stirling Engine is a heat engine that operates off the heat produced by a single flame. The Stirling Engine can be used for classroom demonstrations, or by hobbyists who enjoy heat-to-mechanical energy engines.

Components

Your Basic Stirling Engine comes with the following:

- 1 - Preassembled Basic Stirling Engine
- 1 - Alcohol lamp bottle, nozzle & wick
- 1 - Plastic filling bottle
- 1 - Bag of replacement parts and tools

Set-Up

The Stirling Engine should be placed on a flat, level surface away from anything flammable.

Thread the wick through the alcohol lamp nozzle. The wick is a little larger than the nozzle so you may need to wet the end of the wick or guide it through with the aid of a bent paper clip.

Fill the plastic bottle with either 91% or 99% rubbing alcohol. Use the bottle to fill the alcohol lamp bottle. Then place the nozzle on the bottle. The majority of the wick should be

in the alcohol with only a small part of the wick (1/4") sticking out through the top.

Never try to fill the burner while the wick is lit!

Place the alcohol lamp in its recessed circle on the base of the Stirling engine.

Operation

Using a match or a lighter, ignite the wick on the alcohol lamp. The flame will touch the glass of the Stirling Engine's heating chamber. Let the chamber heat up from the flame for a few moments.

Now give the Stirling Engine's wheel a good spin. If the chamber has been sufficiently heated the Stirling Engine should 'kick in' and start spinning under its own power. Watch and enjoy your Stirling Engine in action!

Once you are finished, extinguish the flame and allow the Stirling Engine time to cool down before moving it or performing any maintenance.

The Stirling Engine can be made to run faster if you clamp it to the table. This will also prevent it from 'walking' on smoother surfaces.

Do not touch the tubing or burner when they are hot.

Never leave the flame unattended

Fuel

In addition to 91% or 99% rubbing alcohol. You can also use any alcohol of 180 proof or better.

Alternatively, you can power the Stirling Engine with Sterno. Use a metal cap filled with Sterno in place of the alcohol burner.

Maintenance

Use a light machine oil (no more than 5W – knife honing oil works great) on metal parts, only if needed. Use a cotton swab to apply the oil. Do not get oil on glass or plastic parts.

If the glass gets dirty, wait for it to cool and clean it with window cleaner.

How does a Stirling Engine Work?

A Basic Stirling Engine has two cylinders. One of the cylinder is kept under constant heat (this is the cylinder under the flame). This causes the gas in the chamber to expand pushing the cylinder out and moving the wheel. The air in the second chamber is compressed. While in larger model Stirling Engines a coolant system would be needed to keep the cycle going this model is small enough that the momentum of the flywheel is enough to keep it operating.

When the wheel spins around from momentum it compresses the air in the heating chamber. The heat from the flame quickly expands from the heat of the flame and the process starts over again.

What are Stirling Engines used for?

A Stirling Engine differs from a Steam Engine in that only the air in the chamber needs to be heated. A Steam engine requires water to be boiled into a gas and that gas then must be pushed into a chamber to move a piston. Stirling Engines are more efficient, quieter, and requires less maintenance than steam engines. They also do not have any boilers that will explode.

However, Stirling Engines were unable to compete with Steam Engines in the 19th century due to material limitations of the era. Larger Stirling Engines experienced many failures and only small engines were of any use.

In the present era, Stirling Engines are finding new uses as heat pumps, and for generating electricity from renewable heat sources such as concentrated sunlight.

New uses for Stirling Engines are being found thanks to modern materials making them viable – as of this writing a device is in development that uses a Stirling Engine powered by a hot cup of coffee. The engine generates electricity that can be used recharge your Smart Phone or other portable electronic device.

Warranty

D Star Stirling Engines have a limited lifetime warranty. This warranty covers defects in manufacture. It does not cover any defects caused by misuse, modification, or damage

Parts and repairs to your Stirling Engine are available at reasonable cost from D Star Engines. Please contact the number below for parts and service either in our out of warranty.

Other Stirling Engines from D Star

D Star Engines produce several different models of Stirling Engine. Here are a few examples:

D Star Low-Temp Sterling Engine – runs off a hot cup of coffee

D Star Vacuum Engine/Flame Licker – An engine that appears to 'eat' the flame that powers it.

Many more designs are available!

Need Help?

Need a hand getting your engine working?
You can call 831-338-8354 or email
rex@dstarengines.com