



## Building a Modular Experimental Turbine Generator Kit

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<https://infinityturbine.com/infinity-turbine-developing-an-experimental-orc-kit.html>

Learn how to design and assemble a modular block kit for miniature ORC and supercritical CO<sub>2</sub> turbines. This guide covers housing, rotors, bearings, thermal blocks, pumps, safety systems, instrumentation, and testing using compressed air or single-shot CO<sub>2</sub> before closed loop operation.



This webpage QR code

**PDF Version of the webpage (maximum 10 pages)**

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## Building a Modular Experimental Turbine Generator Kit

### Introduction

Inventors and entrepreneurs working in the energy field can benefit from a modular approach to turbine experimentation. By building turbines from standardized blocks with interchangeable components, it becomes possible to test multiple designs efficiently, upgrade components easily, and maintain safe working practices. This article outlines the essential components of a small turbine kit suitable for Organic Rankine Cycle (ORC) and supercritical CO<sub>2</sub> experiments, including guidelines for early testing with compressed gases before moving to a full closed loop system.

### Housing and Sealing Blocks

The foundation of the kit is a set of precision-machined block housings that can be stacked and bolted together. These blocks should use O-ring grooves or metal C-seals for high-pressure applications. A baseplate with dowel pins allows for repeatable alignment of turbine, nozzle, and bearing sections. Materials depend on operating conditions: aluminum for low temperature ORC work, stainless steel for higher pressures, and Inconel for advanced supercritical CO<sub>2</sub> testing.

### Turbine Core Components

#### Rotor Options

Radial impulse wheels for simple, robust testing  
Axial micro-stages for multi-stage experiments  
Tesla disk rotors for rapid prototyping with fewer machining demands

#### Bearings

Hybrid ceramic ball bearings are suitable for low-power ORC experiments. For higher speeds and pressures, foil or gas bearings may be considered. Advanced tests may require magnetic or isolated gas bearings to avoid lubricant breakdown in CO<sub>2</sub>.

#### Nozzles and Stators

Interchangeable nozzle inserts with different throat sizes and admission arcs allow tuning of the flow path. Thin shims can be used to adjust tip clearances.

### Thermal Management Blocks

Evaporator: brazed plate heat exchangers or cartridge-heated blocks for hot-side input  
Condenser: water-cooled brazed plate exchangers

Recommended for efficient testing in both ORC and sCO<sub>2</sub> configurations



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