

# Access Energy®Thermapower® Organic Rankine Cycle (ORC) Systems

The Preferred Heat-to-Power Solution for All Land-based Applications

Capture. Convert. Consume.™



## Compact, Efficient and Reliable Heat Recovery

With the largest install base of low temperature ORCs operating around the world, Access Energy has the technology, knowledge and experience to make your heat recovery project a success.

### Engineered for Dependability

The Thermapower ORC uses cutting edge technology to produce reliable, clean electricity. Our patented Carefree® Integrated Power Module (IPM) operates on magnetic bearings and removes the hassle of maintenance with its innovative fully encapsulated design. With its advanced Vericycle™ power electronics and state-of-the-art computer control system, Thermapower is the premier ORC system in the world, offering numerous benefits over competitive technologies, including:

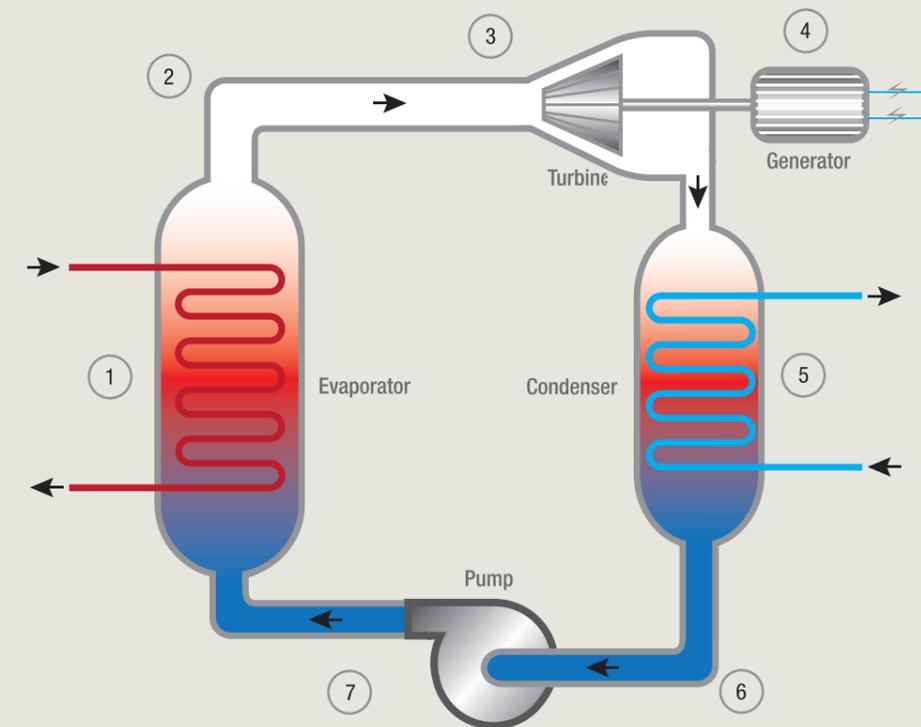
- **High availability and reliability**
  - » Consistent and stable operation with a wide variety of source heat types and conditions
  - » Very low maintenance and operating costs
- **High efficiency**
  - » Variable speed generator allows for optimal speed operation
  - » Self-centering magnetic bearings eliminate friction between rotating parts and reduce product wear
- **Zero emissions or risk of contamination**
  - » No fuel or oil lubrication required
  - » Environmentally friendly, non-combustible and non-flammable working fluid
  - » Modular configuration
  - » Scalable to site (install 1 or 10 units)
  - » Offers opportunity for N+1 redundancy for critical applications
  - » Easy to relocate if required
- **Ease of transport and installation**
  - » Optional 20 ft. container
  - » Only three field connections for immediate use:
    - Connect heat source (hot water or steam)
    - Connect cooling water (from cooling tower or other supply)
    - Connect utility grid
  - » Simple setup and commissioning
- **Fully automated**
  - » Auto start/stop
  - » Load control
  - » Advanced power electronics automatically match grid voltage and frequency
- **Options support**
  - » High pressure hot water (HPHW) controls
  - » Steam valve control
- **Other process controls by specific application engineering**

## Organic Rankine Cycle Process

### How Thermapower® Products Work

The Organic Rankine Cycle (ORC) converts thermal energy into electricity. It does this using a process similar to a steam turbine, but it uses refrigerant instead of water. This allows the ORC to extract energy from low temperature sources.

- ① The heat source transfers thermal energy into the refrigerant causing it to vaporize.
- ② High pressure refrigerant vapor flows into the turbine.
- ③ The refrigerant vapor pushes against the turbine and causes it to spin.
- ④ The turbine turns the generator producing electrical power.
- ⑤ Cooling water extracts thermal energy from the low pressure refrigerant vapor.
- ⑥ The refrigerant is condensed back into liquid.
- ⑦ Liquid refrigerant is pumped into the evaporator.



## Applications

USA Oil and Gas Well



Ship Engine Jacket Water



Japan- Trash Incineration



China- Industrial



Japan- Geothermal Well



South Korea- Fuel Cell



## Thermapower® ORC Technology

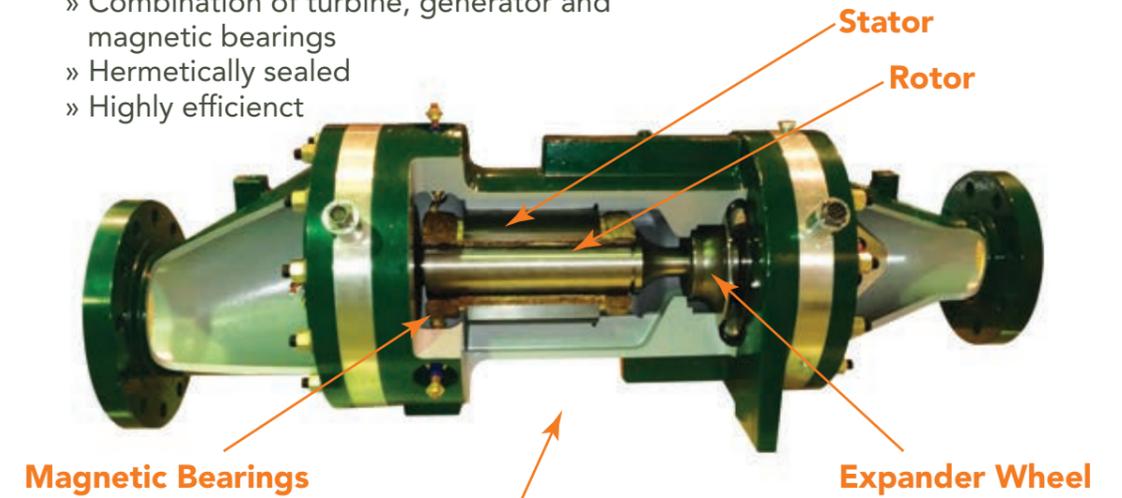
Access Energy's ORC products are the most compact, cost effective, reliable and efficient heat recovery systems available today. A number of competitive advantages are provided by the proprietary components of the Thermapower systems shown below.

- **Receiver Tank**
  - » Ensures liquid is present at pump inlet
- **Programmable Logic Controller (PLC)**
  - » Controls operation of ORC components
  - » Remote operation with Modbus TCP/IP or Web interface
- **Insight™ Magnetic Bearing Controller (MBC)**
  - » Non-contact, no lubrication and low maintenance
  - » Controls magnetic bearings, which levitate the turbine wheel/rotor assembly
- **Power Delivery Unit (PDU)**
  - » Single point connection to the grid
  - » Distributes power to ORC and other ancillary equipment (i.e. PE cooler, space heater, ORC pump, etc.)
- **Vericycle™ Bi-Directional Power Electronics**
  - » Controls the speed and power of the turbine/rotor assembly
  - » Automatically synchronizes turbine output with grid voltage and frequency



## Carefree® Integrated Power Module (IPM)

- » Combination of turbine, generator and magnetic bearings
- » Hermetically sealed
- » Highly efficient



- **Slam Valves**
  - » Automatically re-direct refrigerant flow around IPM during a power outage or shutdown.
- **Refrigerant Pump**
  - » Industrial grade, high-head pump
  - » Variable speed motor adjusts refrigerant flow and pressure to match the heat source conditions



# Thermapower® ORC Products

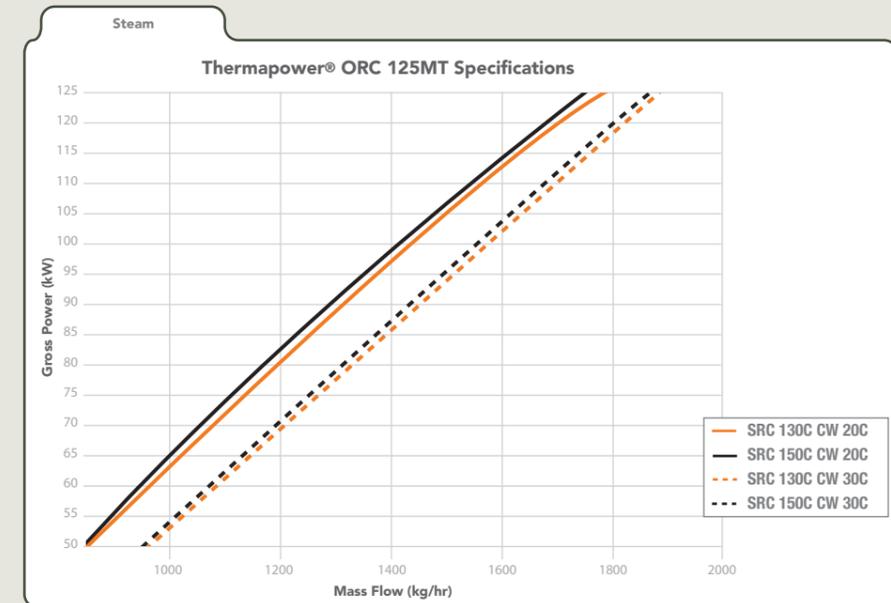
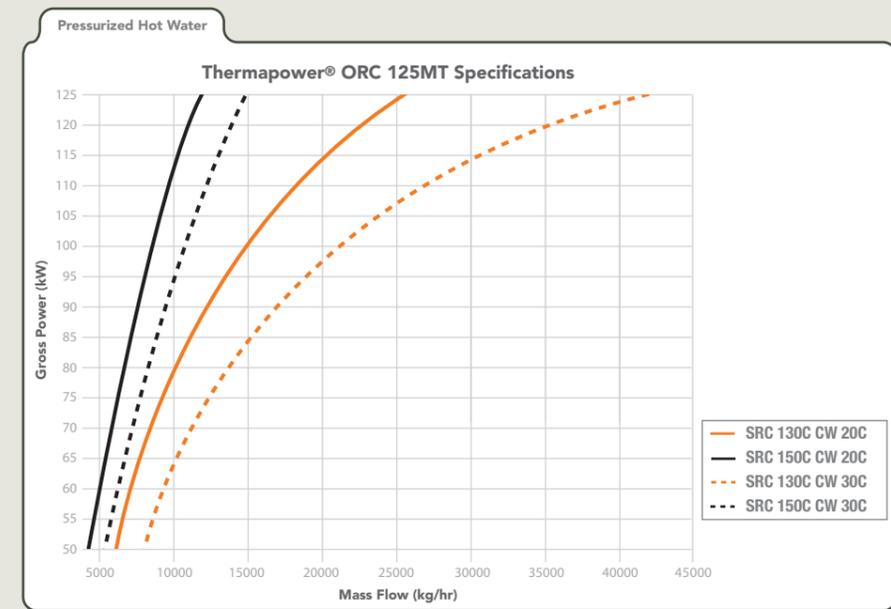
## Thermapower ORC Modules

The Thermapower ORC 125XLT module generates 125kW of clean, utility grade power using recovered extra low temperature heat, and the Thermapower ORC 125MT module generates up to 125kW of clean, utility grade power using recovered medium temperature heat. Both modules are designed for integration with application specific condensers and evaporators. Authorized distributors can assist with optimizing the right module for your land-based application.



## Thermapower ORC Systems

Access Energy's Thermapower Systems include one of the Thermapower modules and are configured and optimized for specific applications. The systems are smaller and lighter than conventional heat recovery systems and require no custom engineering. The module configuration allows them to be dropped into place and hooked up to three field connections for low-cost, rapid deployment. Service for the systems can be aligned with other site equipment, so there is never any disruption to the operation of the plan by the ORC system.



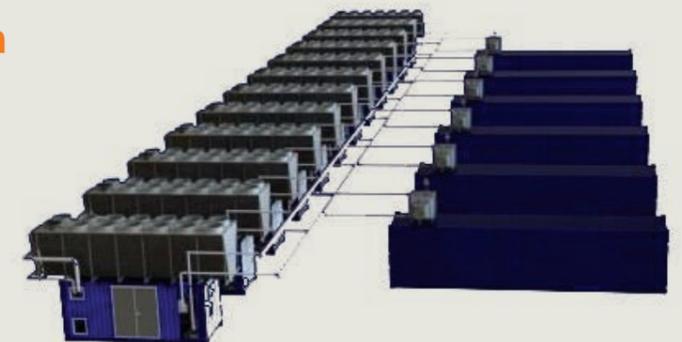
Typical Customer Interfaces	
Connection	Description
Evaporator Inlet/Outlet	4" CL300 RF ASME B16.5 Flange
Condenser Inlet/Outlet	6" CL300 RF ASME B16.5 Flange
Grid Connection	3-Phase 3 Wire with Ground
Internet Connection	Ethernet CAT-5 Cable from Customer Internet

NOTES: SRC is Source Heat Temperature.  
CW is Cooling Water Temperature.

Parameter	Value
Power	125 kW Gross
Voltage/Frequency	380-480 VAC; 50/60 Hz
Input Temperature	130°C (266°F)
Parameter	Value
Working Medium	R245fa
System Weight	7,800 kg (17,200 lb)
System Size	20 ft ISO Container
Module Weight	6,500 lb (2,948 kg)
Module Size	113 in (287 cm) x 50 in (127 cm) x 80 in (203 cm)

## Modular Configuration

The systems can be installed in modular configurations with multiple units.



## Proven Project Implementation Expertise



### Small-Scale Commercial and Industrial Applications

- Incineration · Marine · Geothermal · Solar Thermal · Coproduction · Air & Hydrocarbon Processing
- Compression · Gas Flaring · Boilers · Regenerative Thermal Oxidizers · Amine Treatment
- Turbo Compounding · Glass Production · Iron & Steel Production · Water Treatment · Food Processing
- Cement Manufacturing · Pulp & Paper Manufacturing · Biomass Processing · Aluminum Manufacturing
- Fuel Cells · Petroleum Refining · Natural Gas Distribution · Desalination · Structural Clay Production



Access Energy  
16323 Shoemaker Avenue  
Cerritos, CA 90703  
+1 562.293.1660  
[info@access-energy.com](mailto:info@access-energy.com)  
[www.calnetix.com](http://www.calnetix.com)

Capture. Convert. Consume.™