The rotary heat engine (RHE) is an external combustion Wankel rotary engine driven by Rankine cycle, developed by Da Vinci Co., Ltd. Since displacement type engines can be operated even with relatively low pressure, they are suitable for a system recycling wasted low temperature heat.

**Rankine Cycle**
Phase transition of the working fluid occurs between gas-phase and liquid-phase depending on the input heat. Rankine cycle is a thermodynamic cycle which uses the pressure difference given by such phase transition.

* The pressure difference in vapor phase is converted into torque.

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### Operating Principle of External Combustion Wankel Engine

External pressure turns the rotor of an external combustion Wankel engine, which produces torque. On the other hand, an internal combustion engine converts internal fuel explosion into torque, but it needs a compression process. For a Wankel engine, this compression process causes back pressure, which interferes with its rotation. Therefore, adapting two air supply/exhaust ports makes its loss smaller and can achieve higher output compared to another type of engine with the same volume chamber(s) since there are always two pressurized chambers out of three. In addition, the Wankel engine adopts an eccentric rotor shaft, by which the shaft turns three times at a single turn of the rotor.

### Specification of 10 kW System

- **Input heat source:** 85°C at 3.6 L/s
- **Input cooling source:** 25°C at 4 L/s
- **Required pressure difference:** 450 kPa
- **Generator output:** 12 kW
- **Self power consumption:** 1.8 kW
- **Working fluid:** HFC245fa or HFO1233zd
- **Acceptable Heat Source**
  - From 40°C to 95°C
  - Maximum pressure: 1 MPa
  - Heat-work efficiency: Engine: 5.5 % (actual)

* Twin system: Generator Output 18kW Heat-Work efficiency 8 % (Target for SEP. 2016)

Note: Selecting a right heat exchanger suitable for the type of input heat optimizes the system performance.

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