

Capstone Clean Cycle 125kW Waste Heat to Electricity Generator



The Capstone Clean Cycle waste heat-to-electricity generator uses an Organic Rankine Cycle (ORC) to capture normally wasted heat from a wide range of sources, turning excess heat into clean-and-green electricity while raising the net efficiency of your system. Advanced power electronics and a sophisticated integrated power module join oil-free, low-maintenance magnetic bearings and non-ozone depleting refrigerant to achieve highly-efficient thermal energy-to-power output while still respecting the environment.



Capstone Clean Cycle 125kW

The compact, skid system's fundamental components include:

- Power Electronics: Next-generation design turns high-frequency output into utility-friendly power without the need of expensive capacitors
- Self-Centering Magnetic Bearings: No oil and low maintenance translates to minimal downtime
- Integrated Power Module: High speed turbine expander with highly-efficient alternator is sealed in one small unit with only one moving part
- Environmentally Responsible: Safe, ozone-friendly refrigerant

The Capstone Clean Cycle 125kW waste-heat to electricity generator is one of the components in the Capstone C500 Clean Cycle HE System.

Features and Benefits

- ORC Technology with zero emissions
- Flexible heat-temperature input from as low as 121°C (250°F)
- Ease of synchronization with local utility
- Ready-to-integrate and efficiently designed with minimal footprint
- Highly reliable with only nominal maintenance and ownership costs
- Only one moving part and no gearbox in the integrated power module avoids expensive upkeep
- Magnetic bearings need no oil or lubricants
- The ORC utilizes a PLC-based control system, offering easier integration with customer monitoring and plant management systems
- Remote monitoring and diagnostic capabilities with web-based gateway
- Flexibly designed for both local and remote control
- Ability to capture heat from many systems including engines, boilers, solar thermal installations, industrial heat stacks, and microturbines
- Packaged options available

Reliable power when and where you need it. Clean and simple.

Pressurized Hot Water to Power⁽¹⁾

Waste Heat Conditions

| | |
|--------------------|-------------------------------|
| Inlet Temperature | 143.3°C (290°F) |
| Outlet Temperature | 126.7°C (260°F) |
| Input Energy | 980kW (3,340,000 BTU/hr) |
| Flow Rate | 54,343 kg/hr (119,555 lbm/hr) |

Condensing @ ISO Ambient: 15°C (59°F) 60% RH

| | |
|------------------------|--------------------------|
| Condensing Temperature | 21°C (70°F) |
| Condensing Load | 821kW (2,800,000 BTU/hr) |

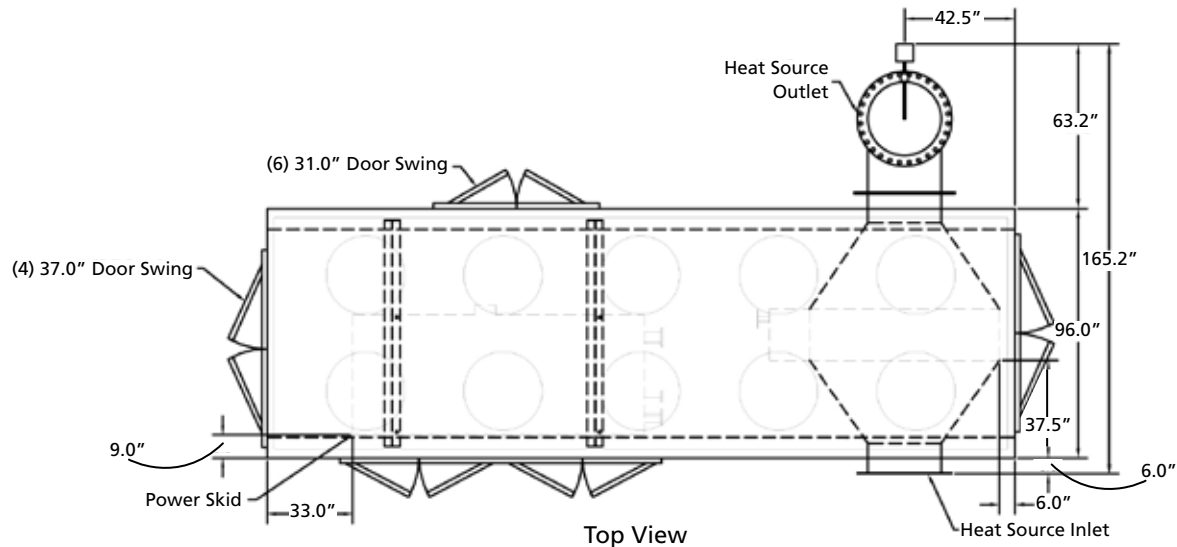
Saturated Steam to Power⁽¹⁾⁽²⁾

| | |
|-------------|----------------------------|
| Temperature | 124°C (255°F) |
| Pressure | 220.6 kPa (32 psia) |
| Flow | 1,678 kg/hr (3,692 lbm/hr) |

Hot Gases to Power⁽¹⁾⁽³⁾⁽⁴⁾⁽⁵⁾

| | Hot Gas Inlet Temperature | Hot Gas Flow Rate |
|---|---------------------------|-------------------------------|
| Gas temperature needed for power output of 125kWe | 204°C (400°F) | 68,182 kg/hr (150,000 lbm/hr) |
| | 260°C (500°F) | 34,091 kg/hr (75,000 lbm/hr) |
| | 315.6°C (600°F) | 22,500 kg/hr (49,500 lbm/hr) |
| | 371.1°C (700°F) | 16,773 kg/hr (36,900 lbm/hr) |
| | 426.7°C (800°F) | 13,295 kg/hr (29,250 lbm/hr) |
| | 482.2°C (900°F) | 11,023 kg/hr (24,250 lbm/hr) |

Capstone Clean Cycle 125kW Weather Protective Housing



- (1) Electrical output gross is 125kWe
 - (2) Waste heat operating conditions: no superheat in steam included. Condensing temperature of 21°C (70°F) and heat exchanger 95% efficient
 - (3) Waste heat conditions: exhaust gas temperature reduced to 149°C (300°F) with condensing temperature of 21.1°C (70°F)
 - (4) Assumed exhaust gas $C_p = 1.05 \text{ kJ/kg} \cdot ^\circ\text{C}$ (0.25 BTU/lbm-°F)
 - (5) Heat exchanger 95% efficient
- Specifications are not warranted and are subject to change without notice.*

