

Turbo Expander Process Gas/Air

API 617

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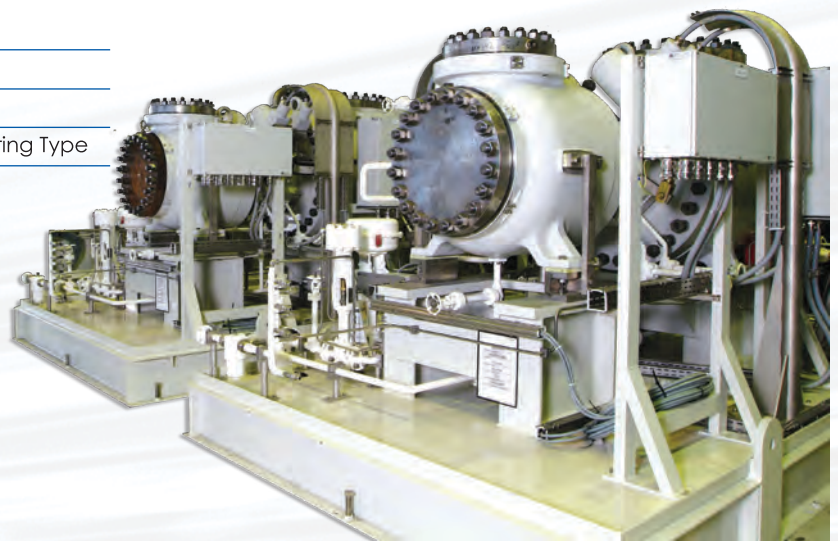
Turbo-expanders, also referred to as expansion turbines, provide a way to capture the energy lost in several industries. Turbo-expanders have a range of applications, but this template focuses on the use of turbo expanders for energy recovery and power generation. Virtually any high-temperature or high-pressure gas is a potential resource for energy recovery.

International Spec: Compliance with API617

Gases: Air, Hydrocarbons and other gas

Power: up to 10 MW

Configuration: Oil lubricated/ Active Magnetic Bearing Type



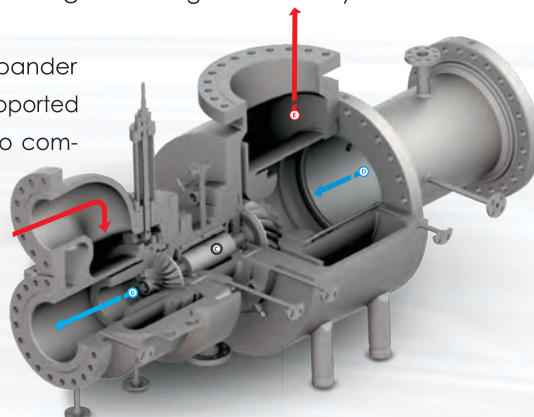
How Turbo Expander Works?

Expander Side

- A** Gas enters through inlet guide vanes creating initial pressure drop and high-velocity vortex.
- B** Additional expansion takes place in expander wheel. A conical defuser is often used to recover remaining velocity.
- C** Extracted power from the expander is transmitted through rotor, supported by oil or magnetic bearings to compressor wheel

Compressor Side

- D** Process gas enters the compressor where the pressure and temperature are raised by the compressor wheel.
- E** Process gas exits the wheel through a vaneless diffuser for enhanced operating range and reliability.



Main Parts

- Variable Inlet Guide Vanes (IGV)
- Wheels
- Shaft
- Sealing
- Bearing
- Labyrinth Seal
- Floating Carbon Seal
- Dry Gas seal
- Oil Seal
- Bearing
- Lub Oil System (for oil lubricated mechanical)
- AMB Panel (for magnetic type machine)
- UCP

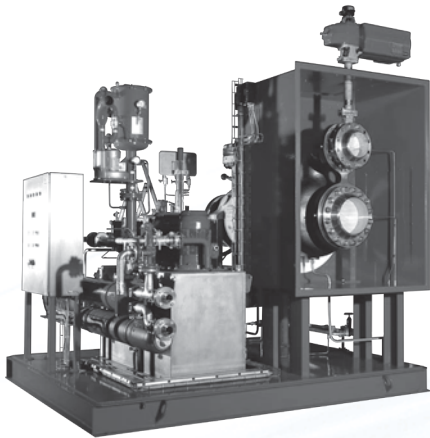
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Industrial Gas

These types of expander, uses in Air Separation Unit (ASU) with low distillation temperature allowing the bulk production of O₂, N₂ and Ar. Types are as below

- Expander with Oil brake
- Expander with Compressor brake
- Expander with Generator brake



Oil and Gas

Customer-engineered solutions for the oil and gas industry are designed to meet a wide variety of customer requirements and provide many years of reliable service.

Applications:

- Liquefied Petroleum Gas (LPG)
- Natural Gas Liquid (NGL)
- Dew-point Control (DPC)
- Liquefied Natural Gas (LNG)
- FPSO - FLNG
- Regasification
- Nitrogen rejection

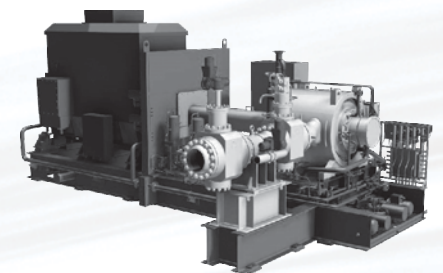


Energy Recovery

Driven by our integral-gear expertise, our turbo expanders can be configured with one to four stages on a single gear-box to achieve the lowest cost- per-kilowatt power-train solution. Power generation reaches up to 10 per unit.

Application:

- Geothermal
- Organic Rankine Cycle
- Kalina Cycle
- Pressure letdown
- Heat recovery
- Waste-heat recovery

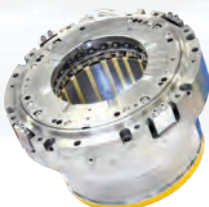


Key Technical Features

Active Magnetic Bearings

Active Magnetic Bearings (no oil system) Compressor loaded Expander customized to fulfill customers' requirements in terms of standards: API standards, local standards or customers' best practice standard can be applied when requested.

- No risk of process contamination by oil
- Elimination of vibration: the active bearings cancel synchronous vibrations by letting the shaft free to rotate around its inertia axis.
- No maintenance concept



Oil Bearing

We offer horizontally-split, high-speed pinion bearings featuring five self-centering pads that ensure stable radiation. Horizontally-split bearings are especially easy to inspect and maintain.

Tilting-pad bearings, which are used on high-speed shafts, and sleeve bearings, used on low-speed shafts, ensure reliable performance, efficiency and optimal speeds for each process.



AMB Machines Parts

- AMB Cartridge
Equipped with Radial and Axial Bearing
- Auxiliary Landing Bearing
- Control Loop
AMB control panel is equipped with a 14kHz digital control unit, 5 axis amplifiers, 3 x 50 % AC / DC convertes

MB Scope of Software

- Live Monitoring / Snapshots
- Date logging
- Advance Graphics