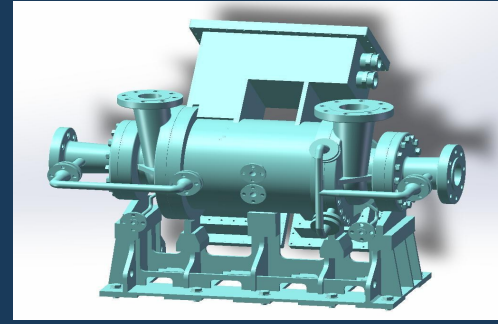


Pressure Energy Recovery Expanders

Application-specific turboexpander-generator systems for natural gas, CO2 and selected industrial process-gas pressure letdown.



Pressure-energy recovery equipment is engineered for the specific gas composition, pressure ratio, flow envelope, outlet-temperature limit and plant safety requirements.

Representative Applications

Application	Representative inlet / outlet conditions	Configuration	Output
Natural-gas pressure letdown	Temperature: 38.5 °C; inlet pressure: 5.1 MPa(A); outlet pressure: 1.8 MPa(A); flow: 13.25 t/h	Maglev natural-gas turboexpander-generator; staged reheating	400 kW; 35,000 rpm
CO2 pressure-energy recovery	Temperature: 31 °C; inlet pressure: 280 kPa(A); flow: 126 t/h; outlet conditions project-specific	Axial CO2 turboexpander-generator; source preheating required	1,500 kW

Product Architecture

Architecture	Potential application	Technical features
Integrated radial maglev turboexpander-generator	Natural gas and selected clean process gases	Active magnetic bearings; high-speed permanent-magnet generation; variable-speed electrical system
Split-type axial expander-generator	Large-flow CO2 or selected process gases	Multi-stage axial expansion; process-specific sealing, materials and generator selection

Engineering Assessment Basis

Process Conditions	Plant Integration
<ul style="list-style-type: none"> - Gas composition, contaminants and phase behavior - Normal/min/max inlet and required outlet pressure - Flow range and pressure-ratio stability - Inlet temperature and minimum allowable outlet temperature 	<ul style="list-style-type: none"> - Preheating or staged reheating requirement - Bypass and pressure-control philosophy - Hazardous-area and gas-safety requirements - Grid, control and emergency shutdown interfaces

Optional Configurations

System area	Project-selectable options
Expander arrangement	Integrated radial maglev unit; split-type axial unit; single-stage or multi-stage expansion
Temperature management	Upstream preheating; staged reheating; outlet-temperature control
Pressure control	Parallel bypass / regulator; automated pressure-control integration; emergency shutdown valves
Electrical and controls	Variable-speed inverter; generator and protection; local PLC/HMI; DCS and remote-monitoring interface
Package scope	Skid-mounted package; process piping and valves; gas detection; recommended spares

Minimum Data Required for Feasibility Review

Required input	Customer information
Gas data	Full composition, contaminants, dew point, phase envelope and material-compatibility concerns
Operating envelope	Normal/min/max inlet pressure, required outlet pressure, temperature and flow
Process constraints	Minimum outlet temperature, allowable pressure variation, bypass philosophy and downstream sensitivity
Site / compliance	Hazardous-area classification, applicable gas codes, grid data, utilities and plot conditions
Commercial basis	Annual operating hours, electricity value, project schedule and required availability

Typical Supply Scope

Base Technical Scope	Project-Selectable Scope
<ul style="list-style-type: none"> - Turboexpander-generator - Control and protection system - Application engineering and performance model - Commissioning support 	<ul style="list-style-type: none"> - Preheater / reheater package - Bypass and pressure-control valves - Gas safety and detection package - Skid, piping, remote monitoring and spares

Project-Specific Technical Definition

Definition item	Defined in project technical proposal
Product rating envelope	Output, inlet/outlet pressure range, flow and temperature limits by media
Performance guarantees	Power definition, expander efficiency, turndown, availability and test method
Mechanical / electrical	Materials, seals, speed, generator voltage/frequency, IP and hazardous-area rating
Codes and supply	Applicable standards, safety certification, dimensions, weights, utilities, exclusions and warranty

Final equipment selection and guaranteed performance require a complete process-data review. Boomtec will provide a project-specific technical proposal after receiving sufficient operating parameters.